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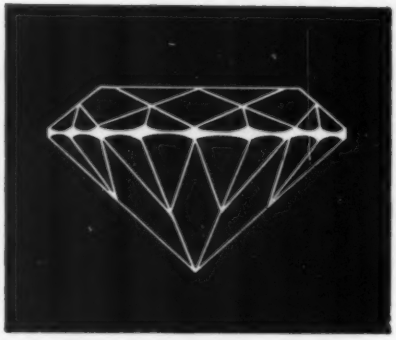

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Vol 20 No 238
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PRINCIPAL CONTENTS

Generally Speaking — Adamant — 165

Testing the Toughness of Abrasive Particles — Dr-Ing. J. Peklenik — 166

Accurate Shop Testing of Diamond Wheels — John W. Ripple — 174

Ball Pins — 176

The Care and Use of Diamond Tools — 178

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Generally Speaking

Seventh Commonwealth Mining and Metallurgical Congress

The preparations for the Seventh Commonwealth Mining and Metallurgical Congress are now well under way. It is to be held in the Union and the Federation in April and May next year; the president of the Congress will be Mr C. S. McLean, General Mining and Finance Corporation.

The final programme promises well and covers most aspects of mining in Southern Africa. Also members will have the opportunity to see a good deal of both countries from a more general point of view.

The first Congress was held in South Africa some 30 years ago and since then striking progress has been made in mining. The extent of this progress will become increasingly evident during the course of the Congress when 90 papers are to be presented dealing with broad principles such as shaft sinking, tunnelling, water problems, and many other relevant topics. Members will also be able to see South African techniques in operation and the individual mines to be visited are making preparations to ensure that their visitors are not disappointed. It is also a possibility that a new world shaft sinking record, in the region of 1,500 ft, will be made while the Congress is in session.

Diamond Sales

It is interesting to note that the sales of gem diamonds for the June quarter this year constitute another record (£17,213,163) as against the previous highest quarter (£16,891,253). The combined total including industrials was also very good though not a record, totalling £23,332,563. The combined quarterly record is £23,596,653 set up during the first quarter of last year. Although the sales of industrials are down on last year, the overall figure is encouraging; there were some quarters of 1958 when the figures for industrials were far below the current total.

ADAMANT.

Testing the Toughness of Abrasive Particles

A report from the "Laboratorium fuer Werkzeugmaschinen und Betriebslehre" of the Technische Hochschule, Aachen.

by ***Dr-Ing. J. Peklenik***

A report on investigations into the toughness of abrasive particles of different grain-sizes and made up of different materials. The system of measuring was developed to suit the requirements of toughness calculation. The unit of measurement adopted was the force necessary to break up the particle when exerted at a given, constant speed. The results of the measurements and certain evaluations are given and analysed in the form of a newly defined toughness scale.

Introductory Remarks

Abrasive particles are one of the component parts of grinding tools. The cutting properties, and therefore the tool-life of the grinding tool depend on the physical properties of these particles, and their behaviour under the thermal and mechanical loads to which they are subjected during the grinding process. The wear process of the tool is characterised by the periodic alteration in the geometric structure of the individual cutting particles which are brought into action during the chip-producing process. The grinding particles are subjected to impulsive loads. As a result wear takes a form which is peculiar to abrasive particles. The cutting properties of the abrasive particles can deteriorate as a result of wear, but in some cases, thanks to the so-called "self-sharpening action," they can undergo improvement. This phenomenon was proved by experimental means. (1, 6, 10).

Before dealing with the question of the toughness of abrasive particles it is necessary to refer to the different kinds of wear which occur during the grinding process. The problem must be adequately defined, since, although toughness is a complex property of the abrasive particles, it does not account for all the influences which are exerted on the particles during the grinding process.

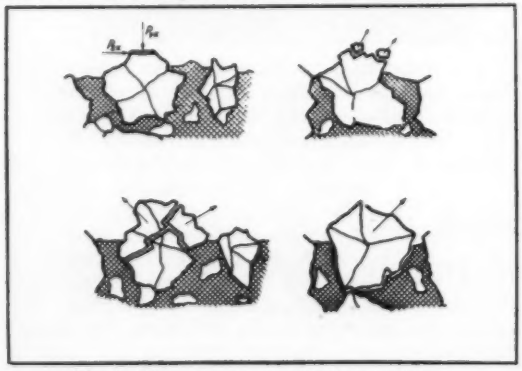

Fig 1. Wear forms on abrasive particles.

Wear on the particles can take four forms (Fig 1). Sometimes a wear surface can be formed on the individual abrasive particles as a result of the high specific thermal and mechanical loads, which cause the surface to become soft at the point where the pressure is exerted (6). As a result of this the cutting properties of the abrasive particle deteriorate. The second kind of wear—when crystal groups splinter off—also causes a larger contact surface between the abrasive particle and the workpiece to be formed, thus, reducing the cutting properties of the abrasive particle.

The remaining kinds of wear—when the abrasive particles are partially or completely broken out of the bond—have a favourable effect on the cutting properties of the abrasive particles. As a result the grains being broken out of the bond, the wear face as a whole loses particles, and new abrasive grains equipped with sharp edges are formed.

The chemical wear, which was proved by E. J. Krabacher (5) to affect the particles during the grinding of titanium alloys, and the glazing of the grinding wheel with the material being ground, will not be dealt with here, since these phenomena are not connected with the toughness of the grains.

While the softening of the abrasive particle under pressure can be attributed to the effect produced on the particle by heat, and depends on the thermophysical properties of the grinding material, the complete break-out of the particle is determined by the tensile strength of the bond bridges. Thus these two forms of wear cannot be regarded as effects of the mechanical properties of the grain-material either.

Both of the remaining forms of wear—the kind which occurs when crystal splinters away from the particle, and the partial break-out of the particle itself—can, however, be regarded as

being directly dependent on the so-called toughness or friability of the abrasive material. As a result this physical property of the abrasive particles is of great importance as far as the behaviour of the cutting edges of the grinding tool during the grinding process is concerned. K. Giesen (3) defines the toughness of the abrasive particle as a property which can be characterised by the resistance to alteration of the surface and to lasting deformation under percussion, pressure, and feed stresses as well as abrasion. The expression toughness includes a series of physical properties which tend to make any exact mathematical treatment of the problem difficult. From the work which has been published so far, it can be seen that up to now attempts to solve this problem have been limited to the experimental approach.

The following basic principle has been derived from these experiments. In measuring technology the toughness of abrasive particles is expressed by means of the following two physical qualities.

1. by the amount of force (in pounds) which is needed to destroy a particle (Pemberton process);

2. by the percentage of particles, which are not destroyed after being subjected to a given load, measured by means of sieve analysis such as the "Diskus" stamping die method, the "Abrasive" centrifugal process, the "Tyrolit" breaking process, the rumbling process, etc.

Since a detailed description of this, and comparative results of experiments are to be found in the work of K. Giesen (3), a further examination of this subject will be dispensed with here.

One of the most important conditions for this kind of testing is that the particles should be carefully sieved, in order to obtain, as far as possible, particles of equal size. For this purpose mechanical sieving is recommended. It was especially noticed in these tests that toughness is influenced by the need to obtain the greatest possible regularity in the particles, both in shape and in size. From measuring particles of nominal grain-sizes, which had been carefully sieved, it was found that the greatest dimension d_{k1} and the dimension d_{k2} of the individual particles, (Fig 2) are subject to wide deviations. (7)

The use of only carefully sieved particles of the same nominal grain-size, as was necessary in the tests, is not faithful to conditions met in practice, since blended grain-sizes are used in grinding wheels. The toughness of such a blend, in which the grain-sizes are subject to considerable fluctuation, is basically different in its physical properties and their distribution from a powder made up of particles which are, as far as possible, regular in size. Thus it is possible that errors may arise in judging the toughness of the nominal grain-sizes tested and the grain-sizes actually used in grinding tools.

The test method considered here does not permit any greater variation in determining the toughness of a range of grain-sizes, since errors in evaluating the results would otherwise be too great. Thus the value of this method as evidence is limited. Difficult requirements have to be met when developing a test method for determining the toughness of different materials, and even of similar materials if they have different properties. This can be attributed to the composition of these cutting materials, and to the kinds of load to which they are subjected during the grinding process. It is absolutely essential to allow for these two factors when formulating a method of testing for toughness.

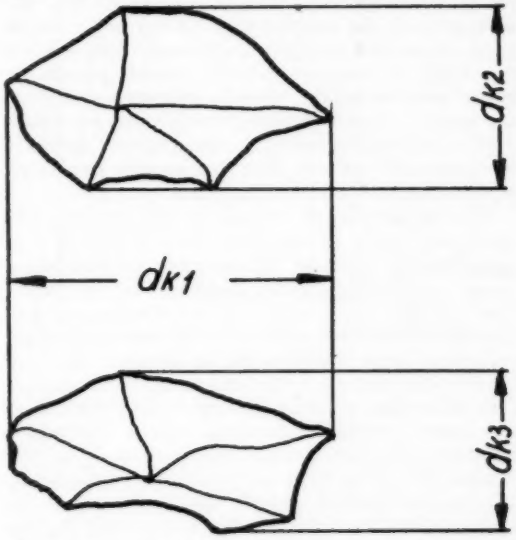

Fig 2. Characteristic dimensions of an abrasive particle.

The characteristic grain dimensions, d_{k1} and d_{k2} are subject to certain statistical distributions, which can be determined with the aid of improved measuring techniques. Crystal orientation and flaws have considerable influence on the toughness of the individual particle. There are two known methods of solving these problems qualitatively (2, 4). For obvious reasons, however, tests of this kind cannot be included in a workshop examination of the toughness of abrasive particles. These and other factors must be regarded as unknown incidental values, and

can therefore only appear in the final results of experiments on toughness. A precise determination of their influence on the test results is impossible without extensive experiments. In this article they will not be taken into account. In choosing the load we worked on the presumption that the strain arising in the grain during the grinding process is so great that crystal groups or larger sections splinter away from the particle. The cause of these stresses can be found in the mechanical and thermal loads, which exert an impulsive force, as has been explained above. Grinding tool wear caused in this way is a stochastic quality of the toughness and other properties of the grain material. Only under certain conditions can the expression toughness be taken to include the wear behaviour of the grain-surface, for the softening of the cutting edge of the grain under pressure is of a completely different nature from the kind of wear in which crystal groups or larger sections of the particle splinter away from the grain. The abrasion particles are so small, that in testing according to the present methods of toughness testing, they are usually evaluated as loss during the sieving process.

The behaviour of a particle largely depends upon the speed or the time during which it is subjected to the load. Consequently this has a decisive influence on the toughness of the grain. The absolute dimensions of the mechanical and thermal loads which are exerted on the individual particles during the process of grinding are not known with accuracy, but the time during which they have effect can be determined by means of the cutting speed. Experience shows that when grinding with low cutting speeds $v = 5 \ldots 10$ m/sec. the proportion of particles splintering off is considerably larger than with $v = 30$ m/sec. This is to be attributed not only to the greater forces involved when grinding with low cutting speeds, but also to the difference in the time during which the load is exerted on the individual particles. For this reason the time during which the load is applied should be included in the testing, when toughness experiments are being conducted.

In K. Giesen's definition of the toughness of a grinding particle quoted above, the time factor is not taken into account. In the accepted methods of testing the time factor has to be included because of the nature and the duration of the testing. Here, however, it does not have the physical significance which it attains when considered in relation to the load speed. With a view to fulfilling these requirements, attempts were made to develop a test method for determining toughness which would find the basic

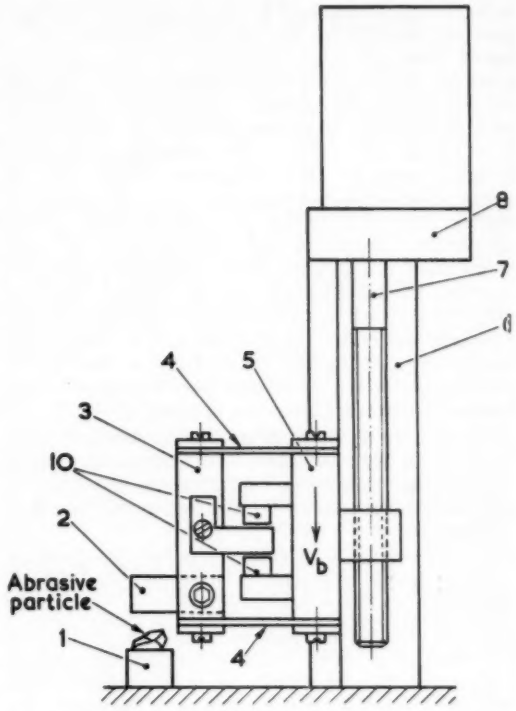

Fig 3. Device for testing the toughness of abrasive particles.

physical relationships. The test conditions were laid down when the testing apparatus was designed. The dimensions of the particles and their statistical measurements are, however, to be taken into account when evaluating the results of the experiments.

In the tests the individual particle is subjected to an increasing force P_b, until it shatters. The load speed v_b is constant. The stress σ_e which is produced inside the particle, is equivalent to the stress which causes the destruction of the particle through mechanical and thermal loads during the process of grinding.

Strictly speaking, when laying down the test conditions, these loads should be applied at a constant speed and in constant proportions. When carrying out a test in workshop conditions this requirement is difficult to fulfil.

A practical solution to the problem, taking into consideration the force P_e, necessary for the equivalent stress, and a defined load speed, is reproduced in Fig 3. The particle is placed on a sintered-carbide base (*1*). The counterpart (*2*) is also made from sintered-carbide, and is held

in the supporter (*3*). The supporter (*3*) is elastically connected to the carriage (*5*) by means of flat springs (*4*). With the aid of a lead screw (*7*) the carriage (*5*) is moved in the slide (*6*) at a constant speed by the motor (*8*) in the direction of the particle. When the counterpart (*2*) strikes the particle, the flat springs are distorted under the increasing force P_e until the particle is destroyed. The carriage (*5*) now continues to move in the same direction. Immediately after the particle has been destroyed the slide movement is switched off. The elastic deformation of the flat spring (*4*) is proportional to the force P_e and is measured inductively.

The force P_e depends on the extent to which many influential factors, such as the size, shape, nature, and quality of the particle, come into play. For this reason it is necessary, when carrying out these experiments, to test a large number of particles, if any conclusive judgement of the toughness properties of the material is to be made. Statistical methods must be used when evaluating the results of the tests. The curve for the force P_e exerted during the crushing of the particle is given in Fig 4. With a large grain several force peaks are apparent, denoting the points where separate parts of the grain splinter off or where the entire particle is shattered (Fig 4a). The smaller particles $d_k < 0.7$ mm. however, show only one peak with the load speed $v_b = 100$ mm/min. which was used in the tests (Fig 4b). This method of testing differs from the one proposed by A. Pemberton in that the load is applied to the particle at a constant speed.

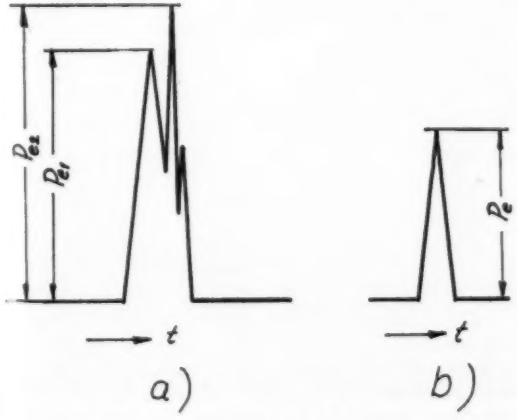

Fig 4. Curve of the force P_e during the crushing of the particle.
a = particle size 10
b = particle size 60.

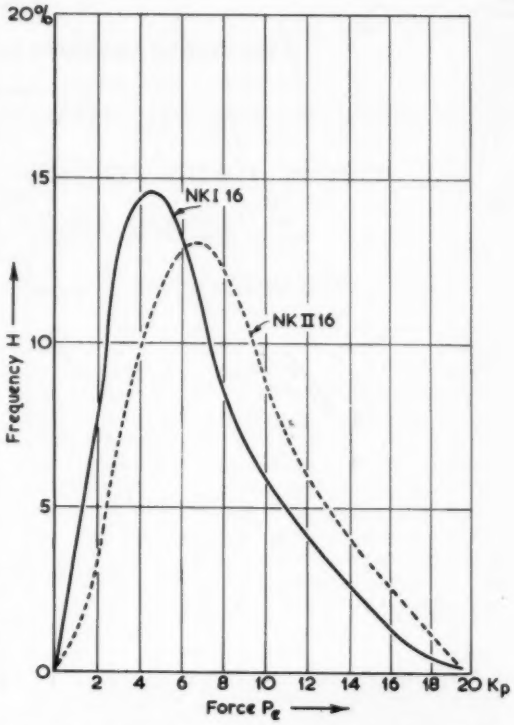

Fig 5. Frequency distributions of the force P_e grain size 16, normal corundum.

The execution of the tests and the figures obtained from them

Using the method described above, toughness tests were carried out on normal and high-grade corundum and on silicon carbide of varying grain-sizes. The data for the grain-sizes examined, and the results of the tests are collected in Table 1.

For each grain-size tested, a large number of separate grains (N = 600 . . . 750) were thoroughly measured. Because of considerable variations in the dimensions of the particles, and other influential factors which could not be evaluated, it is necessary to determine the distributions of the forces P_e, their average values and deviations.

In Fig 5 two frequency distribution curves for normal corundum grain-size number 16, qualities I and II are shown. From this it can be seen that the position of the curves differs considerably. Tests made on the differences in the forces $\overline{P_e}$ gave clear results. With the aid of the accepted testing methods it was found that the distributions for the forces P_e correspond to the two-dimensional Maxwell distribution.

TABLE 1.

Experimental conditions and results of toughness tests.

Grain size number	Cutting material	Type	Measured particle volume in mm — Average values $\bar{d}_{k1}$	$\bar{d}_{k3}$	Variations s_{k1}	s_{k3}	Measured forces — Average values $\bar{P}_e$ in p	Variations s_e in p
12	NK	I					11800	7000
		L					15730	7540
	EK	I					8320	5000
	SiC	I	2,704	1,561	0,393	0,270	8550	5630
16	NK	I					6800	3878
		II					8314	3984
24	NK	I					2880	1163
		II					2980	1730
		M I					3680	1620
		M II					4030	1760
		L					3370	1770
	EK	I					3690	1670
		II	1,140	0,784	0,272	0,147	2560	1450
	SiC	I	1,251	0,670	0,210	0,136	2990	1730
		II					3320	1810
36	NK	I					2190	1050
		II					1710	710
		M I					1570	720
		M II					1730	750
		L					1660	770
	EK	I					1480	830
		II	1,116	0,504	0,193	0,103	1610	800
	SiC	I	0,971	0,478	0,158	0,088	1740	1130
		II					1850	1110
46	NK	I					910	460
		II					980	470
	EK	I	0,649	0,306	0,134	0,066	940	430
	SiC	I	0,703	0,373	0,151	0,071	1090	580
60	NK	I					690	360
		II					570	280
	EK	I	0,518	0,228	0,117	0,051	530	300
	SiC	I					670	400

The same analyses were also carried out on two grades of silicon carbide powder (I and II) of grain-size 24. In Fig 6 the frequency distribution curves for the forces P_e are reproduced. The two SiC powders were also seen to differ considerably as far as the forces P_e are concerned. Examination of the distribution curve revealed the same distribution rule as for grain-size 16. Naturally, however, this does not provide adequate proof that the two-dimensional Maxwell distribution is valid for all grain-sizes. This problem should be the subject of further investigations.

The relationship found when the average values for P_e are plotted against the average standardised particle dimension d_{km} is illustrated

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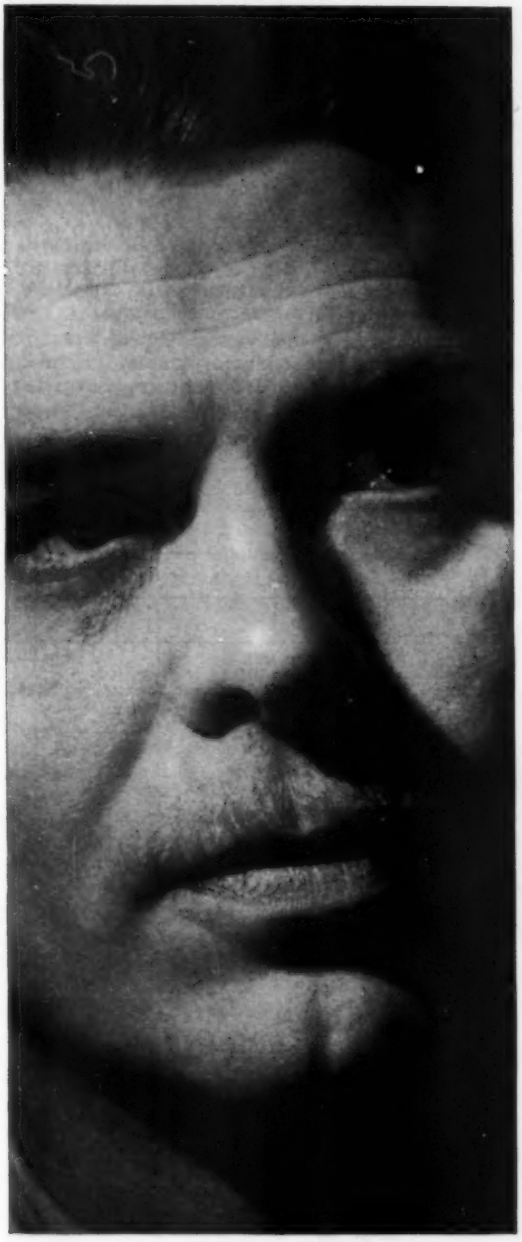

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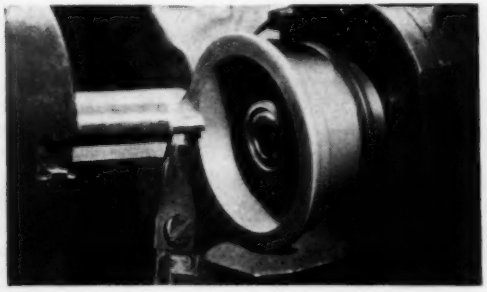

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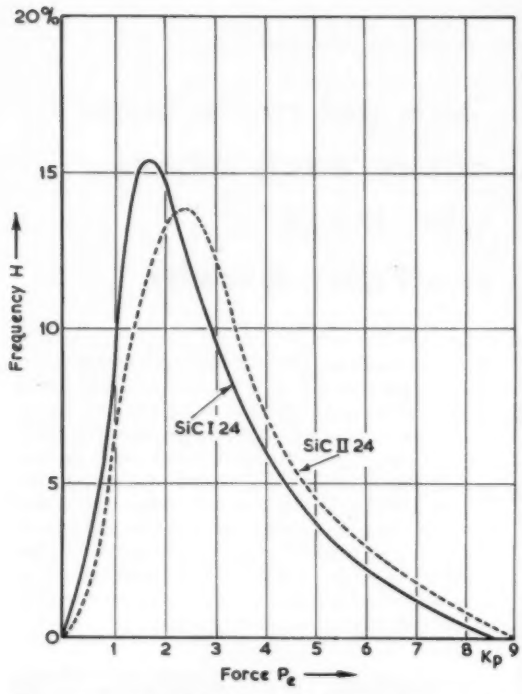


Fig 6. Frequency distributions of the force P_e for grain size 24, Sic quality I and II.

in Fig 7. This shows that in the range of grain-sizes extending between 24 and 60 no clear trends are to be found in the curve for the forces $\overline{P_e}$. From this it will be recognised that the measurement of the force exerted does not alone constitute sufficient means of distinguishing between the differences of toughness behaviour in the different qualities of grain. Thus, when comparing the $\overline{P_e}$ values for SiC and NK for instance, the fact that with normal corundum the average size of the dimension d_{k1} amounts to 1.4 mm., whereas with silicon carbide it is 1.26 mm. should be taken into account (see table). The same tendency is to be observed with grain-size 36. In this case the differences in the forces measured are slight. Here too they can be attributed to the difference in the dimensions of the particles.

Definition of the toughness denominator and the evaluation of certain test readings.

From these basic observations it can be seen that the load speed and the dimensions of the particles must be included in the discussion and definition of toughness. K. Giesen's (3) definition of toughness is therefore amended as follows: the toughness of a particle of given dimensions consists of the resistance of the particle to alterations of shape and dimensions under periodically varying mechanical and thermal loads. In order to determine the toughness, it is necessary to look for a denominator expressing the toughness properties of the particle. The implicit form of the toughness equation can be written as follows:

$$Z = f(d_{k1}, d_{k2}, d_{k3}, P_e, t). \qquad (1)$$

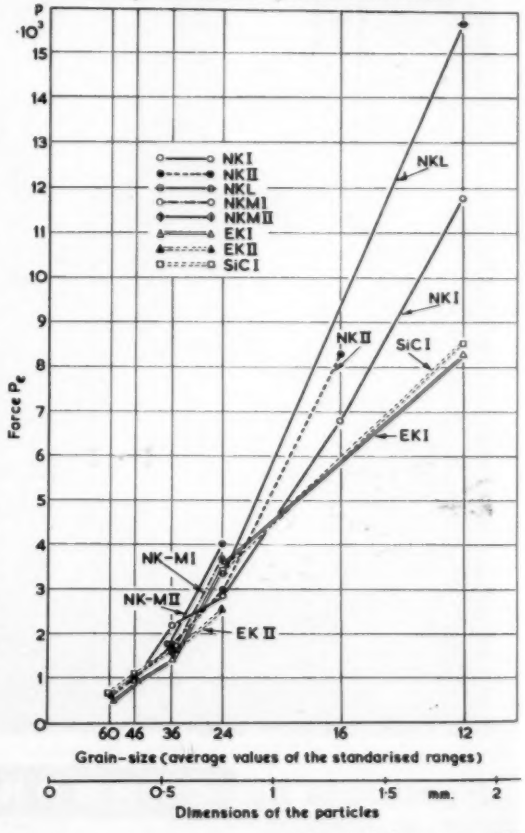
in which:

d_{k1}, d_{k2}, d_{k3} = the characteristic dimensions of the particle, in mm.

P_e = mechanical load on the particle, producing an equivalent stress oe in the particle, in kp or p.

t = the time of the application of the load, in seconds.

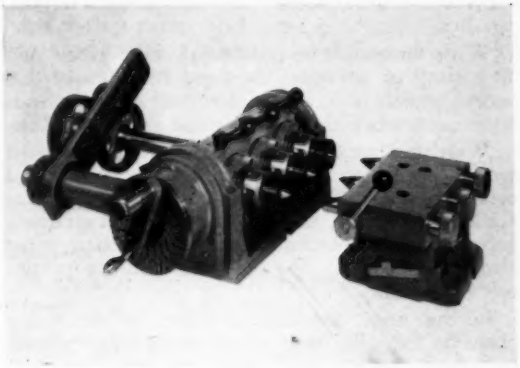
Fig 7. The relationship between the forces P_e and the average standardised particle dimensions.



Concluded on page 179

Hofmann Multi-Spindle Attachment for Flute Milling

An unusual multiple spindle dividing head is being marketed by Adcock & Shipley Ltd., and manufactured by Maschinenfabrik Dionys Hofmann of Onstmettingen, Germany. This attachment (see illustration) has three spindles enabling three components to be milled simultaneously. Also provision is made for driving the dividing head from the lead screw of the milling machine so that spiral milling can be carried out. To do this spiral milling it is, of course, necessary to swivel the table of the milling machine to an angle, in which case, under normal circumstances, one milling cutter would contact the workpiece before the others. To overcome this the spindles can be adjusted axially to counteract the effect of swivelling the table so that milling will commence on all three components simultaneously. This attachment is very suitable for milling flutes in spiral reamers, taps, etc. The axial adjustment of the spindles is sufficient for lead angles up to 45° and, in addition, the attachment can be swivelled and



adjusted up to any desired angular position from horizontal to vertical. The centre height of the spindles is $4\frac{3}{4}$ in. and the distance between the spindles is $4\frac{5}{16}$ in. All spindles run in the same direction and the total width of the dividing head is $15\frac{3}{4}$ in.

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Accurate Shop Testing of Diamond Wheels

*by John W. Ripple**

With thousands of pounds at stake every year in a shop of any size, the need for tests of diamond wheels is obvious. Many testing methods have been worked out, but most are inadequate.

Weighing and measuring the wheel and the work before and after grinding is valid and establishes a ratio of wheel wear—but this is for the laboratory, not the shop. To get accuracy requires more precision equipment than most shops can justify. The short test and the torture test are others.

In the first, specified amounts of stock are ground from a test piece, with the wheels measured before and after the grinding. If enough tests can be run, this could be satisfactory, but a small error in measurement could balloon into a large variation in actual results under normal shop conditions.

In the "torture tests" two wheels are compared at high infeed rates for a specified number of pieces. This is known as "giving the wheels a real workout," but it is exactly opposite to recommended shop practice. The results are completely undependable.

Recording the dates that a wheel is put on new and taken off worn out is another possibility.

If a shop has a large number of one type of tool coming through regularly, all wheels can be tested on that tool only. Once a standard number of tools per wheel has been established, test wheels can be run against the standard. For any shop which has such a tool, this is a good test method.

Recommended test method

The proposed test method, it is believed, is adaptable to conditions in most shops, including those which have a wide variety of non-repetitive work.

For the test, three wheels are required. The two wheels to be compared must be new. The third need not be. One of the test wheels, normally the one currently in use, is the standard wheel. The second is the test wheel. These are carefully measured and the dimensions are recorded before the wheels are issued to the test operator. When he gets the wheels, he mounts them carefully on wheel mounts to secure greatest concentricity. Each wheel remains on this mount throughout the test.

All work which comes to the test machine is carefully sorted into two equal groups. These should be as nearly identical as possible, containing the same number of pieces with heavy stock removal and with light. The third wheel is used on the odd work.

For instance, suppose that a lot of eight cutters is to be ground. One cutter has a new tip, which will require considerable stock removal. The others are in normal condition.

In this case, three cutters would be ground with the standard wheel, and three with the test wheel. The odd cutter and the one with the new tip would go to the third wheel.

This procedure is repeated until one of the wheels being compared is used up. No record of pieces need be kept, since both of these wheels are grinding identical piece-parts. The amount of diamond abrasive section remaining on the surviving test wheel is the measure of its superiority. The performance of the standard wheel is considered as 100%.

For example, suppose that 0.250 in. was worn off the standard wheel and 0.202 in. of the new test wheel. Dividing the wheel wear figure for the standard wheel by the wheel wear figure for the test wheel (0.250 ÷ 0.202) gives a result of 1.24, or 124% performance for the test wheel.

A 10% margin is provided to take care of normal errors. The test wheel should run at least 110% of the standard wheel before the later is replaced, or less than 90% of standard before the test wheel is dropped.

Advantages of this procedure

It requires a minimum of records. Wheel measurements at the beginning and end of the test are the only data required.

Both wheels are treated equally. There is no question about which wheel did more work.

It is adapted to shop use.

On the other hand . . . .

Three wheels are required where one would normally be used.

Wheels must be frequently changed, which makes the test less practical for large wheels.

Considerable time may be involved, since

* Product Manager, Diamond Products, Bonded Abrasives Division, The Carborundum Company.

Reprinted with permission from Carbide Engineering 1960 Vol. 12 (7) p 20 (July).

both wheels must be nearly or completely worn out.

It is strictly a wheel-to-wheel test, based on current conditions.

However, if the operator understands the method and is careful in conducting the test, and if the test is repeated at suitable intervals—say once a year, or whenever there is a substantial change in the character of work going through the shop—this method will provide shops with a better and more practical test than most that are now in use.

News in Brief

M. Kahan, chairman of the Diamond Mining Utility Company in Windhoek, South Africa, stated recently that an aero-magnetic survey for oil and natural gas had revealed a sedimentary basin in SW Africa. He would not comment on the survey report as all gas and oil concessions in the region were held by another company, the Trans-American Mining Corporation.

It rested with the latter company as to whether the presence of the sedimentary basin would lead to further investigations and seismic survey. Kahan said that his company held other mineral rights in the area and from its point of view there were interesting features in the report.

The survey occurred in a region known as 'diamond area No 2' and along the Skeleton Coast.

Rhodesia Chrome Mines Ltd recently announced the discovery of nephrite jade in the Midlands of Southern Rhodesia. It is thought to be the first discovery of this mineral in Southern Africa.

Nephrite-jade presently fetches prices varying between 15s and £15 a pound.

The forthcoming Autumn Fair, which will take place in Utrecht, Holland, from Monday 12th—Saturday 17th September inclusive, will contain exhibits—including jewellery, gold and silverware—from 1063 firms from 23 countries, Britain being third with 48. The Fair covers a total net exhibition space of 16,000 square metres.

Concluded on page 178

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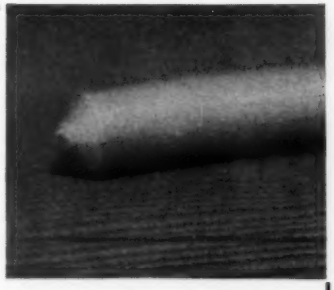

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Ball Pins

A New Type of Set-up for Automatic Centreless Grinding

For the automatic grinding of ball pins similar to the normal type shown by Fig 1, an interesting automatic equipment has been designed by Arthur Scrivener, Ltd., in connection with their No 2 controlled-cycle centreless grinding machine, which includes a couple of items of more than ordinary interest.

The piece is ground simultaneously on the radiused head and tapered portion of the shank, and the loading of the piece between the wheels is effected by swing over transfer fingers which pick up and transfer the work in much the same way as a human hand and forearm (Fig 2). The rotary table is first loaded with a full charge of 32 pieces, and at the commencement of the cycle the transfer fingers swing back

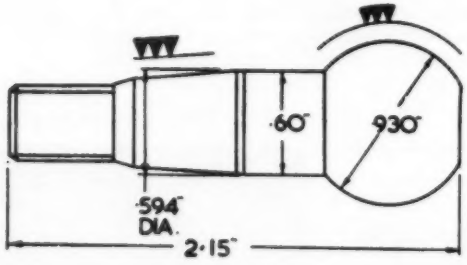


Fig 1. Drawing of a typical ball pin.

and close upon the piece which is in alignment with the grinding throat of the machine, swing over to lay it on the workplate between the wheels, and release it as soon as it is in position. The controlled-cycle mechanism of the machine then comes into operation to advance the control wheel and piece against the grinding wheel, maintaining it in position until it is ground, after which the control wheel recedes and the fingers of the transfer mechanism close on the small end of the ground piece, swinging this back to replace it on its former position on the rotary table and release it. As soon as the piece is released, the table (the movement of which is synchronised with the controlled-cycle mechanism of the machine) indexes forward one station, and the cycle recommences. The table indexes clockwise, and the ground piece is ejected into a shute as soon as it reaches the removal hook which can be seen at the rear

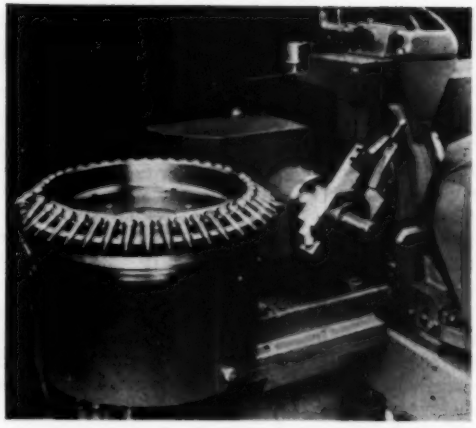
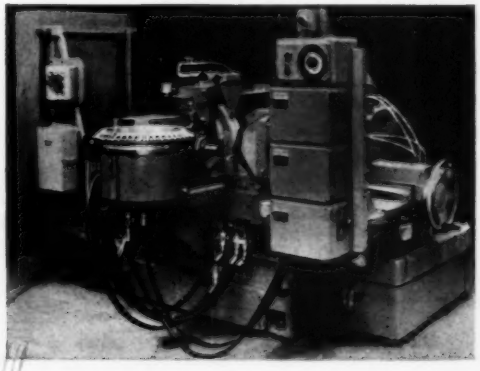


Fig 2. Rotary table and swing-over transfer fingers.

of the table. With a stock removal of some 0.008 in., the production of the machine is approximately 240 per hour.

Truing of the radius on the grinding wheel for form-grinding the ball end of the piece is an important factor in ensuring finish and accuracy. The radius-truing attachment for this can be seen on the left-hand side of the machine (Fig 3) and its operation can be followed on reference to the line drawing Fig 4. It will be seen from the latter that it consists in essentials of a C-shaped diamond carrier "A" with trunnions "B" at

Fig 3. Scrivener No. 2 with full automatic equipment for grinding ball pins.



each end. The surface of this carrier when viewed in plan is semi-circular, and it is thus substantially supported by the similar concave of the exterior base or support "D" with top and bottom bearings in which it is mounted. By means of the handle and adjustable gate shown, the diamond holder is movable through 180 degrees.

The device is mounted on the barrel of the normal form-truing attachment, by which arrangement the grinding wheel can be trued to any desired taper or form from the usual former plate until in its traverse across the wheel the diamond reaches a predetermined stop, at which point the traverse of the truing slide can be arrested, and the required radius or arc then generated by the movement of the hand lever controlling the radius truing device. In this way, when it is necessary, it is possible to generate a true arc as an emergence or continuation of the form which has already been dressed on the grinding wheel from the former plate. Another feature of the device is that no breakdown in the set-up and no opening-up of the wheels is necessary in order to put it in operation.

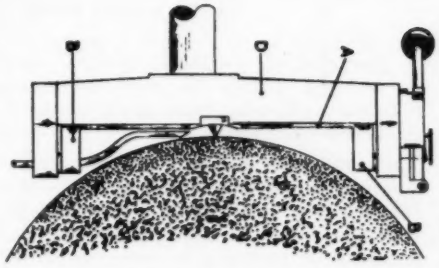
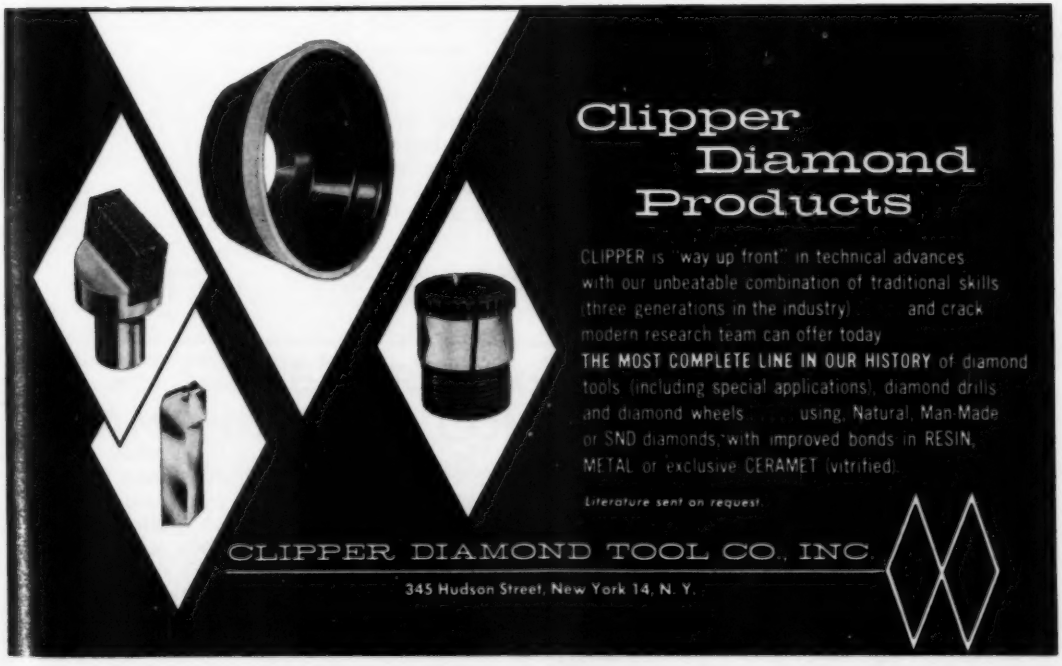


Fig 4. Drawing of radius truing attachment.

On the control wheel side of the machine, this wheel also requires dressing with a somewhat similar radius but, being of a much smaller arc, this latter can be dressed on the wheel from the former plate, as the control wheel merely serves to support the piece and does not require to envelope it in the same way as the grinding wheel.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*The Care and Use of Diamond Tools**

(1) A diamond tool should be held securely in a rigid holder to prevent vibration. Vibration will very often result in shattering the diamond.

(2) The tool post holding the diamond tool should be inspected from time to time to see that it is rigid. Run a tap through the set screw holes in the diamond tool holder occasionally to make certain the set screws turn freely and grip the diamond tool securely.

(3) The diamond should be brought into contact with the wheel at a slight angle just below the centre line of the grinding wheel (5° — 7°), so that there is a slight drag on the stone. Never make contact above the centre of the wheel. This will cause severe vibration.

(4) When starting to dress the grinding wheel, the diamond should be brought up to the highest point on the face of the wheel until contact is barely made and then traversed fully across the wheel in both directions. The diamond should never be brought in from the side on the first pass. If the operator takes too heavy a cut it will damage the diamond severely.

(5) After the first pass the diamond should be fed in 0.001 in. for each successive complete pass in both directions. Too heavy a cut may result in excessive wear or damage to the diamond.

(6) Wet dressing is not absolutely necessary but often desirable. It is important, however, to avoid intermittent heating and cooling of the diamond. When dressing wet, maintain a constant flow of coolant in order to avoid injury to the diamond.

(7) Never dress a grinding wheel on a cold machine. Make sure the machine has been running long enough to warm the bearings. Check the bearings from time to time to see that the spindle is rigid. Any play or lash in the spindle can be destructive to the diamond.

(8) When the diamond is worn down to the metal of the holder it is time for resetting. An excess of sparks means the holder is being ground away which will ultimately loosen the diamond. Wheel marks on the holder indicate improper use of diamond tools.

(9) Never grip a diamond tool at the diamond end, in a vice, or apply other severe pressure, in order to extract the tool from the tool holder. Considerable damage may result if lateral pressure is applied. If the tool cannot be freely extracted from the holder, provision should be made to drive it out from the back.

(10) Diamond is the world's hardest material, however, because of this property, diamond is brittle. It does not require a very hard blow to damage a diamond. It may be fractured or broken by striking any hard substance such as the bed of a machine or concrete floor.

* Reprinted by courtesy of the New York Diamond Tool Co Inc, East Orange, N.J., from their catalogue.

News in Brief (concluded)

Bay State Abrasive Products Co., Westboro, Mass, has purchased the Felker Mfg. Co. of Torrance, Calif., it has been announced by Arthur E. Gilman, president of the Massachusetts grinding wheel firm. Felker are well-known manufacturers of diamond abrasive cutting wheels used in many industries including construction, marble and granite, building, ceramic, lapidary and electronic (crystal cutting). They also manufacture machines and accessories used in these industries . . . . cut-off, lapping compounds, and core drills. The Felker Co. will be operated as a wholly owned subsidiary of Bay State and no immediate changes are planned in its operation. By purchasing Felker, Bay State will become one of the largest suppliers of diamond abrasive products in the United States.

The Israel Ministry of Education plans to expand the recently inaugurated two year post-primary schools and to introduce additional subjects, including diamond polishing. The two year schools have a study schedule of 45 hours a week, 27 of which are devoted to academic studies, the remainder to either vocational or agricultural training. Tuition fees are on average I£50 to I£80.

Concluded from page 172

As far as the definition of the toughness denominator is concerned, it should be emphasised that here it is not a matter of looking for strict theoretical solutions. The number of chance influences which affect toughness is so great that such a solution for a technical range of grain sizes is very difficult to find. It is, however, open to question whether such treatment of the problem would in fact mean a practical advantage.

The toughness denominator is proportional to the force P_e and the time t in which the load is applied to the particle, and in reverse proportion to the dimensions of the particle.

To a first approximation the force P_e is distributed over the cross-section of the grain, which is defined by the dimensions d_{k1} and d_{k2} or d_{k3}. The time t depends upon the load speed v_b and the particle dimension d_{k2} or d_{k3} ($d_{k2} \sim d_{k3}$). Considering the predominantly octahedral shape of the particles and the corresponding deformations the equation 1 can be written as follows:

$$Z = \overline{P}_e / \overline{d}_{k1} \cdot v_b \ [\text{p sec mm}^{-2}]$$

v_b = load speed in mm/sec.

Two kinds of grain, SiC I and EK II of grain-size 24 were evaluated according to formula 2. In Fig 8 the relationship between the toughness denominator and the actual particle dimensions $\overline{d}_{k1}$ is shown. From the shape of the curve it can be seen that silicon carbide is considerably tougher than fine corundum. It is also apparent that with SiC the toughness denominator increases degressively as the grain-size becomes larger. These results show that the toughness of abrasive particles can be determined by the method described in his article. There is no doubt, however, that much further investigation is necessary before reliable comparative values for all sizes, types, and qualities of grit can be given.

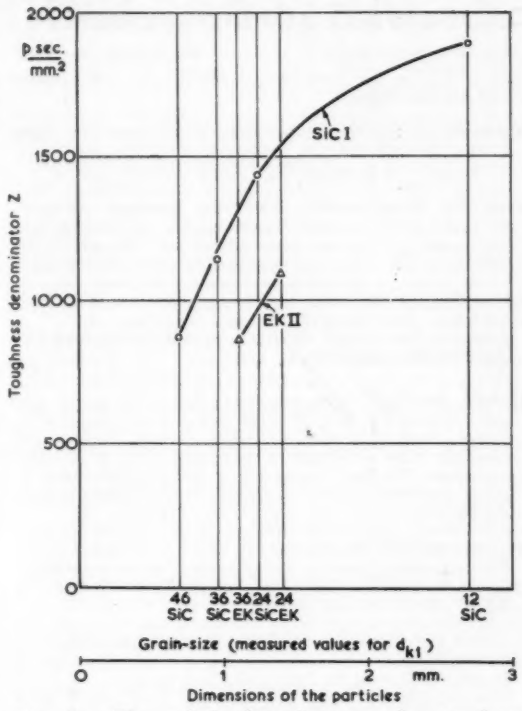

Fig 8. The relationship between the toughness denominator and the actual particle dimensions.

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ADVERTISERS' INDEX

	Page
Carborundum Co. Ltd.	171
Clipper Diamond Tool Co. Inc.	177
Compentrad Ltd.	173
Diamant Boart	163
Diamond News, The	180
Drukker, D. & Zn. N.V.	164
Habit Diamond Tooling Ltd.	Cover III
Henderson Diamond Tool Company, Ltd., The	179
Impregnated Diamond Products Ltd. ...	Cover IV
Indusmond (Diamond Tools) Ltd	161
Industrial Diamond Co. (Sales) Ltd. ...	Cover II
Triefus & Co. Ltd.	Cover I
Vacuum Research Corporation	175
Wolverhampton Diamond Die & Tool Co. Ltd.	163

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1960 Volume 17
SEPTEMBER

DIAMOND MINING AND INDUSTRY

Record gem sales in June quarter

Anon. *Financial Times* 1960 (22128) p 13 (July 6)

Gem diamond sales through the Central Selling Organisation during the June quarter of 1960 reached a new record at £17.2 million. Their value compares with the previous peak of £16.9 million for the September quarter of 1959. Although sales of industrial stones fell off, the total value of diamonds traded in the June quarter, £23.3 million, is just £3 million higher than in the previous three months and not much lower than the record £23.6 million attained in the first quarter of 1959. Aggregate value of 1960 sales until June is £43.7 million, just under £1.5 million below that of the same period last year. A comparison of gem and industrial sales for the last six quarters is given. 2 tables. *D* *F.251*

Diamond industry's happy achievement

Anon. *Diamond News* 1960 Vol 23 (8) pp 3, 5 (May)

Comments arising out of Mr. H. F. Oppenheimer's statement in the annual report of De Beers for 1959. *D* *F.25*

Diamond industry's activities during past year [:] Some interesting facts and figures from report of De Beers' directors

Anon. *Diamond News* 1960 Vol 23 (8) p 17 (May)

D *F.25.361*

Israeli diamond industry expanding

Anon. *Gemmologist* 1960 Vol 29 (348) p 140 (July)

In terms of production and number of workers the Israeli diamond industry now occupies second place to Belgium among the world's leading producers, ranking with Western Germany and the United States. Figures are quoted to bear out this claim. Israeli production of gem diamonds is about one-third of the Belgian output. It is said that in some classes of diamonds, especially melées, Israel is now regarded as a leading supplier. Predicted diamond exports for 1964 are expected to reach a value of 55 million dollars. It is also reported that a representative of the Tel-Aviv diamond exchange has visited the Ivory Coast to set up a permanent office for the acquisition of uncut diamonds for the Israeli industry. *D* *F.25.351*

Diamonds in the Soviet Union

Anon. *Min J* 1960 Vol 255 (6518) p 98 (July 22)

The diamond production of the USSR in 1965 is expected to increase by about fifteen-fold as compared to the 1958 level. No definite target figures are available, but Russian experts say that some 9,000,000 ct will be needed to meet the demands of steel production, which it is anticipated, will be some 90,000,000 tons. Importance is attached to Russian production as an industrial competitor to the United States. Various deposits are described and the adverse climatic conditions are considered. *L* *F.13.33*

In praise of the flawless gemstone. Das Hohelied vom lupenreinen Edelstein

A. Nehm. *Dtsch Goldschmiede Ztg* 1960 Vol 58 (7) p 379 (July) (In German)

In answer to an article in *Sueddeutsche Zeitung*, the writer discusses the effect of the manufacture of synthetic diamonds and the discovery of diamond fields in Russia on the world market. He feels that natural diamonds will not decrease in value, since synthetic sapphires and rubies have been manufactured for years without affecting the price of genuine stones, and calls attention to the recent agreement made between the USSR and the London Diamond Syndicate. *K* *Eb.12.33/Fh Ha*

Scientific and technical news from abroad. Nouvelles de la science et de la technique à l'étranger

Anon. *Prospection et Protection du sous-sol* 1959 (12) pp 53-58 (Dec) (In French, original in Russian)

Gives details of the diamond production of the capitalist countries. Refers to the discovery of a new diamondiferous deposit in India. 1 table. *K* *Ebb.12.371/F.13*

Yakutsk diamonds

N. Timofeev. *Tekh mol* 1959 Vol 27 (11) p 22 ; *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (3) p 1080 (June) (Original in Russian)

D *F.332*

General Electric's diamond technique

Anon. *S Afr Min Engng J* 1960 Vol 71 Pt 1 (3511) p 1225 (May 20)

GEC are producing between 40 and 50 million synthetic stones a year weighing some 3.5 million ct at a cost of about 22s 6d/carat. *D* *Ff Ha*

CONTENTS

Diamond Mining and Industry...	A209	Rock Drilling	A218
Physical, Chemical, and Mechanical Properties of Diamond	A211	Grinding and Polishing of Carbides and Metals	A219
		Machining Developments	A222
Physical, Chemical, and Mechanical Properties of Hard Materials	A211	Production, Grading and Recovery of Abrasive Particles	A223
Diamond, etc, in Instruments	A212	Tool Production...	A224
Hardness and Wear Testing	A213	Powder Metallurgy	A225
Truing of Grinding Wheels	A213	Miscellaneous	A225
Precision Machining of Metals	A215	Book Reviews	A226
Cutting and Machining of Stone, Glass, etc ...	A218	Trade Literature	A228
Gem Polishing	A218	Patent Lists	A229

Metal markets and the Congo

Anon. *Min J* 1960 Vol 255 (6518) p 103 (July 22)

Recent events in the Congo are likely to affect considerably the market for crushing boart, it is said. Over 80% of the Free World's production comes from the Kasai district of the Congo. The North American market, having large strategic stockpiles, will probably be the least affected. A prolonged stoppage from the Congo may also boost the synthetic diamond industry, it is claimed. *L* *Fg.13.265/Fh.25*

Examples of the work of the associations. Aus der Arbeit der Verbaende

Anon. *Gold u Silber* 1960 Vol 13 (7) p 29 (July) (In German)

The Vice-Chairman of the Deutsche Diamantenindustrie spoke of the difficulties encountered by the German diamond industry, especially with regard to supplies of rough diamonds. He regretted in particular the Belgian ban on exports of rough diamonds for gem cutting purposes. *K* *F.25.322*

Diamond mining in Guinea

E. M. Bruton. *Gemmologist* 1960 Vol 29 (348) pp 121-131 (July)

Diamonds are sixth in the range of exports from Guinea, W Africa, where alluvial diamond deposits adjoin those of Sierra Leone. The three organizations concerned with diamond mining are the Société Guinéean de Recherches et Exploitations Minières, the French Société de Beyla, and 'Bekima' or the Co-operative Africaine d'Exploitation des Diamants, which is described in detail. Mining methods and living conditions are among topics covered. 6 illustr.
D *F Hd.3671*

Belgian import of polished diamonds ; Belgian export of polished diamond ; Belgian import of cuttable rough diamonds

Anon. *Diamond News* 1960 Vol 23 (8) pp 30-31 (May)

Volume in thousands of carats and value in millions of Belgian francs are given for imports and exports of polished diamonds from and to various countries. Import figures for cuttable rough diamonds are also given. *D* *F.251.3235*

[Belgian exports and imports of diamonds during April, 1960]

Anon. *Gemmologist* 1960 Vol 29 (348) p 131 (July)
D *F.251.3235*

Mining miscellany

Anon. *Min J* 1960 Vol 255 (6519) p 134 (July 29)

Diamonds worth over £1,500,000 were produced in Tanganyika during Jan-May, 1960.
D *F.13.364*

Tanganyika diamond exports in March and April 1960

Anon. *Diamond News* 1960 Vol 23 (8) p 29 (May) ; (9) p 33 (June)

Exports for March 1960 : 35,496 ct of total value £316,000 (177s 10d per ct). Total exports for Jan to March 1960 : 136,992 ct of total value £1,312,803 (191s 7d per ct). Corresponding exports for March 1959 : 20,803 ct of total value £203,479 (195s 7d per ct). Total exports for Jan to March 1959 : 52,629 ct of total value £460,285 (175s 4d per ct).

Exports for April 1960 : 906 ct of total value £8,200 (181s 6d per ct). Total exports for Jan to April 1960 : 137,726 ct of total value £1,236,919 (179s 7d per ct). Corresponding exports for April 1959 : 39,617 ct of total value £737,217 (159s 10d per ct).
M *F.13.364*

Alluvial diamond returns for February and March 1960

Anon. *Diamond News* 1960 Vol 23 (8) pp 35-36 (May) ; (9) pp 35-36 (June)

Rough and uncut diamond production in Feb 1960 for Cape Province : 5,750.75 ct of total value £51,014 (177s 5d per ct) ; Private Estates : 177.50 ct of total value £2,013 (226s 9d per ct) ; Transvaal Province : 17,990.75 ct of total value £57,928 (64s 5d per ct). Thus, total production amounted to : 23,919 ct of total value £110,955 (92s 9d per ct).

Rough and uncut diamond production in March 1960 for Cape Province : 5,233.35 ct of total value £52,169 (199s 5d per ct) ; Private Estates : 234.25 ct of total value £3,102 (266s 0d per ct) ; Transvaal Province : 17,056 ct of total value £58,343 (68s 5d per ct). Thus, total production amounted to : 22,523.50 ct of total value £113,614 (100s 10d per ct).
M *Ebe F.13.361*

Operations grasshopper opens up Surinam's untapped mineral frontier

Anon. *Engng Min J* 1960 Vol 161 (6) pp 107-113 (June)

Diamond is among mineral occurrences plotted on a geological sketch map of Surinam released in Jan, 1959. Exploration crews have already found diamonds near Table Mountain in the central area. 13 illustr.
D *Eb.12*

Diamond yield forecast in 1980

Anon. *Diamond News* 1960 Vol 23 (8) p 7 (May)

Senator Jan de Klerk, Minister of Labour and Mines, addressing the Cape Afrikaans Chamber of Commerce, said it was estimated roughly that by 1980 the country's diamond yielding capacity would not be higher than 1,757,000 ct annually at about £6 ct, because of the shortage of ore reserves. *D* *F.16.361*

Melee

Anon. *Gemmologist* 1960 Vol 29 (344) p 59 (Mar)

A plant for manufacturing mechanical diamond dops is to be built in Nathanya, and is expected to increase output of diamond polishing factories by between 15 and 20 per cent. *A* *Jldb Qc*

Mining blueground at De Beers

W. S. Gallagher (General Manager, De Beers). *Engng Min J* 1960 Vol 161 (6) pp 92-102 (June)

Geology, early mining, underground mining, chambering, the block cave system, treatment and recovery plants, and the fine diamond section are among topics covered. 20 illustr, 5 tables.
D *Ebd.361*

Proceedings at the April, 1960, General Meeting

Anon. *J S Afr Inst Min Metall, J'burg* 1960 Vol 60 (11) pp 559-565 (June)

An address by G. S. Giles on 'Modern practices in diamond mining in Southern Africa' is given in full ; other papers mentioned have already been abstracted in *Industrial Diamond Abstracts.*
D *F Hd.361*

Treatment and recovery practice at Kimberley mines of De Beers Consolidated Mines, Limited

E. Colvin, H. S. Simpson. *J S Afr Inst Min Metall, J'burg* 1960 Vol 60 (10) pp 503-524 (June)

18 illustr. *D* *Hg.3612*

Test questions. Pruefungskenntnisse

Anon. *Dtsch Goldschmiede Ztg* 1960 Vol 58 (6) p 316 (June) (In German)

In answer to a test question, the difference is explained between river diggings and dry diggings with reference to diamonds. *A* *Ebb*Ebeb*

PHYSICAL, CHEMICAL, & MECHANICAL PROPERTIES OF DIAMOND

Increased grinding speed with new natural diamond grit

Anon. *Optima* 1960 Vol 10 (2) p 94 (June)

Refers to the new natural diamond grit, the result of research at the Diamond Research Laboratory in Johannesburg, which has properties superior not only to synthetic diamond but to the natural diamond grit previously supplied for grinding. The grit is for use in metal bonded matrices and can cut at least 50% faster than any previous rate when used in saws and wheels. An important factor is its ability to grind more efficiently than synthetic grit such materials as marble and tiles.

See also *Industr Diam Abstr* 1960 Vol 17 p A163 (July). *D* *Kl*Kmf*

S.A. research team repels U.S. diamond challenge

Anon. *Diamond News* 1960 Vol 23 (8) p 24 (May)

Describes development at the Diamond Research Laboratory of the improved natural diamond grit for use in metal bonded grinding tools. Other original work at the laboratory is mentioned.

D *Jy Kl.132.361*

New diamond for metal bonded wheels

General Electric Co, Detroit 32. *Mod Mach Shop* 1960 Vol 33 (1) p 217 (June)

Refers to the development and commercial availability of synthetic diamond for metal bonded grinding wheels.

See also *Industr Diam Abstr* 1960 Vol 17 p A142 (June). *D* *Fh Nvh Urc*

New machine to probe the unknown

F. H. McGraw & Co. *US Industr Dig* 1960 Vol 2 (3) p 9 (Mar)

An ultra-high pressure machine, said to be capable of producing synthetic industrial diamonds and garnets and hitherto unknown minerals and metals on a commercial basis, can develop temperatures of 2,800° C and pressures of 1.5 million lb/sq. inch. The equipment was designed to be sufficiently large to serve for manufacturing rather than laboratory purposes.

D *Fh Ha Pr Vcb*

Hydrogeological characteristics of the 'Mir' diamond pipe deposit in southwestern Yakutia

A. I. Efimov. *Biul MOIP Otd geol* 1959 Vol 34 (3) pp 150-151 (May-June); *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (3) p 1080 (June) (Original in Russian)

D *Ebc.332*

Composition of admixtures in diamonds from the Urals and Yakutia

M. A. Gnevishev, J. M. Kravtsov. *Dok Akad Nauk SSSR* 1960 Vol 130 p 1319; *Insdoc List* 1960 Vol 7 (10) col 911 (May 16) (Original in Russian)

D *F U.33/F U.332*

Diamond compass

Anon. *Diamond News* 1960 Vol 23 (8) p 7 (May)

The Soviet news agency *Tass* says that Soviet physicists have invented a portable apparatus to detect diamonds in soil samples in the field. The gadget, called the 'diamond compass', makes use of the luminescence of diamond when irradiated by radioactive isotopes. *D* *F.12:W*

PHYSICAL, CHEMICAL, & MECHANICAL PROPERTIES OF HARD MATERIALS

Energy spectrum of holes in diamond-type crystals

K. Ya Shtivelman. *Fiz tverdogo Tela* 1960 (2) p 499; *Insdoc List* 1960 Vol 7 (9) col 777 (May 1) (Original in Russian)

D *Bdf Um*

Tensile behaviour of pyrolytic graphite at 2,750° C

H. E. Martens, W. V. Kotlensky (California Inst of Technology). *Nature, Lond* 1960 Vol 186 (4729) pp 960-962 (June 18)

2 illustr, 1 table, 4 ref.

D *Bhbb Unlc Vbb*

Elastic constants of synthetic single-crystal corundum at room temperature

J. B. Wachtman jun, W. E. Tefft, D. G. Lam jun, R. P. Stinchfield. *J Amer ceram Soc* 1960 Vol 43 (6) p 334 (June)

4 ref, 1 table. *D* *Bbc Unc*

Vanadium in steel

Anon. *Mech World* 1960 Vol 140 (3492) pp 285-286 (July)

Mentions effects on steel as a cutting material.

D *Ceg Rw U*

Why molybdenum is a tough metal to machine F

H. J. Siekmann. *Amer Mach* 1960 Vol 104 (13) pp 126-127 (June 27)

2 illustr, 2 tables. *D* *Bfq Ceq*

Machinable stainless

Universal Cyclops Steel Corp, Bridgeville, Pa. *Amer Mach* 1960 Vol 104 (13) p 4 (June 27)

In field tests, type 303-MA, a new sulphurized 18-8 stainless steel alloy containing up to 1% aluminium, has shown production rates, tool life and surface finish which are said to be 15 to 30% better than standard free-machining type 303. Corrosion resistance is also superior. *D* *Bfdb Uc*

Giant crystals break a machining barrier F

Linde Co, Div of Union Carbide Corp. *Amer Mach* 1960 Vol 104 (13) p 111 (June 27); *Prod Engng* 1960 Vol 31 (26) p 19 (June 27)

New single crystals of refractory materials such as tungsten contain small amounts of impurities and thus brittleness caused by inclusions is limited. Of greater importance is the fact that these crystals can be formed and worked at temperatures well below those normally needed for refractories. Various machining operations described include diamond grinding of the body of a vanadium rod, 3/16 in. diameter and ¼ in. long. A columbium washer was cut off from a cylinder and turned with a diamond tool. 2 illustr.

D *Ba Vhf:Vb/Bfu Ceqb Nf/Bfu Chc Nv*

Structure and properties of rare-earth and yttrium hard metals

I. Binder. *J Amer ceram Soc* 1960 Vol 43 (6) pp 287-292 (June)

21 ref, 7 tables. *D* *Bfz U*

LITERATURE REQUESTS

When applying for the loan of literature abstracted in this journal, please quote the title of the article, the name of the author, and the number of the page on which it appeared.

Identifying precious stones (XVIII). Wir bestimmen Edelsteine

Anon. *Gold u Silber* 1960 Vol 13 (7) pp 30-31 (July) (In German)

Discusses the identification of precious stones by means of luminescence and the spectroscope.

K *Bb Ccb Ukn Wcp*

FP 1,192,478 **Union Carbide Corp** (Dec 31, 1956—conv date, USA)

Process and apparatus for encouraging the growth of crystal boules. Procédé et appareil pour provoquer la croissance de boules cristallines

(3 claims, 3 illustr).

D *Vhf W.545/Vhf.1456.545*

DIAMOND, ETC, IN INSTRUMENTS

A trace for inspectors

National Research Development Corp; J. E. Baty & Co Ltd, Burgess Hill, Sussex. *New Scientist* 1960 Vol 8 (194) p 343 (Aug 4)

An optical-mechanical instrument, the Optotrace, can do a range of inspection work which includes checking simple and complex internal and external forms, hole sizes, centre distances, angles and profiles. Magnification is variable between 50 and 500 times.

As a stylus on the device is brought into contact with the workpiece being inspected, a master line appears on the viewing screen. This line is the image of a trace previously produced by the Optotrace itself from a master, which may consist of a component, template, or built-up unit. When the stylus is moved along the workpiece, any deviation from the nominal dimensions is indicated by the displacement of the line from a datum point, thus providing a direct check on workpiece accuracy. A diagram shows the various parts of the device, which include a diamond scriber to cut the master trace. 1 illustr. *D* *Ncz Wc*

Study of hydro-mechanical systems applied to machine tools. Etude de cycles hydromécaniques appliqués aux machines-outils

C. Macabrey. *Mécan Élect* 1960 (131) pp 113-118 (March) (In French)

10 illustr. *A* *Pr Psc.21*

Preview—the Microprobe

Standford University, Metallurgical Engng Dept. *Engng Min J* 1960 Vol 161 (6) pp 49-50 (June)

A probe used for micro-studies of minerals shoots a tiny stream of electrons and penetrates the polished surface of a metal to a depth of one micron. The probe is considered to have many potential applications, *eg* it can determine the alignment of crystals in a substance, or even act as a catalyst in micro-chemical reactions. *D* *Bc.21:Wcz*

Industrial spectroscope. Industrie-Spektroskop

Anon. *Industriekurier* 1960 Vol 13 (94) p 338 (June 22) (In German)

This new instrument is designed for rapid spectroscopic analysis in a wide range of industrial applications. With the aid of auxiliary carbon electrodes it can be used for analysing non-metallic materials. 1 illustr.

K *Wcp*

Numerically controlled inspection

J. S. Broatch (Pratt & Whitney Co Inc). *Tool Engr* 1960 Vol 44 (6) pp 91-95 (June)

Without using special set-ups or gauge blocks, the numerically controlled gauging system described can repeat measurements within 25 millionths of an inch. A computer determines coordinates of any required point on a complex surface, numerical control locates the stylus at the point, and electronic gauges sense deviations that automatic output equipment records. 6 illustr. *D* *Qd Wpd:Wbbz.1456*

Use of moiré-fringe techniques for the measurement of velocity

G. Hodgson. *Instrum Pract* 1960 Vol 14 (6) pp 638-641 (June)

Moiré-fringe techniques were found to be a feasible way of measuring the ram velocity of a shaping machine in order to establish the cutting speed of the tool. An account is given of a velocity gauge consisting of a line and space grating system and its associated optical components and a frequency meter. The separate units are described and a full explanation of their operation is given. 8 illustr, 8 ref.

D *Ceg Pr Ugfb Vfd:Tfdz*

Improved machining accuracy

Anon. *Metal Ind, Lond* 1960 Vol 97 (3) p 46 (July 15)

The further application of moiré fringes to engineering measurements and to automatic control of machine tools is now being studied at the National Engineering Laboratory.

E *Pr Tfdz Vfd/Pr Tfdz Wp*

With a diamond, on glass

L. Whistler. *Optima* 1960 Vol 10 (2) pp 103-110 (June)

The author describes the evolution of the various techniques he uses to engrave glass with diamond, including line engraving and stippling. The handling of large sheets of glass is described, the methods ranging from acid-engraving to drilling and a combination of methods to obtain different effects. 5 illustr.

D *Bm Cp Nc*

Different aspects of indexing

J. E. Hyler. *Mod Mach Shop* 1960 Vol 33 (1) pp 136-137 (June)

A brief discussion of some available types of indexing devices and attachments for machine tools. 1 illustr.

D *Psv*

Swiss P 340,756 (Oct 6, 1958) **R. T. Luedeman, Daystrom Inc**

Method for the heat polishing of irregularly shaped sapphires. Verfahren zum Feuerpolieren unregelmässig geformter Saphire

The method refers in particular to stones for jewel bearings. In glass manufacture, irregularities are removed by heating to a temperature near the melting point, making use of the forces of surface tension. While temperature control and heating method are irrelevant for glass, they are of great importance for sapphire because of its high melting point and the need to approach this temperature very closely. Flame polishing cannot be employed as it results in surface deformations of the jewel. The problem has been solved by heating finely polished sapphires *in vacuo* to between 1,760° and 2,032° C, until the forces of the surface tension have become effective so that a final polish is produced on the sapphire without affecting the exterior dimensions. High frequency induction heating or resistance heating is suggested. (3 claims, 4 illustr).

J *Ax Bbd Chm Vbb.54*

HARDNESS AND WEAR TESTING

Studies on the microhardness of metals. The dependence of the indentation hardness on the load

A. M. Shams El Din, N. Ibl. *Schweiz Arch angew Wiss* 1960 Vol 26 (6) pp 246-250 (June) (In English, abstr in German and French)

The present theories explaining the dependence of the micro-hardness on the load are shortly reviewed. None of them adequately explains such a relation. A new theory is presented postulating a back pressure from the metal surface. 6 illustr, 18 ref, 2 tables.

K *Bf Unhd.21*

Analysis for the diamond-cone indentation hardness

K. Kuroki. *Trans Japan Soc mech Engrs* 1960 Vol 26 p 75; *Insdoc List* 1960 Vol 7 (8) col 705 (Apr 16) (Original in Japanese)

D *Cvdb Ndg Vu*

Accurate shop testing of diamond wheels

J. W. Ripple. *Carbide Engng* 1960 Vol 12 (7) p 20 (July)

See *Industr Diam Abstr* 1960 Vol 17 p A6 (Jan).

D *Nv.1341*

An improved microhardness tester for high-temperature use

J. H. Westbrook. *Bull Amer Soc Test Mat* 1960 (246) pp 53-58 (May)

Micro-hardness testing is the most efficient and often the only means of obtaining information on the temperature dependence of strength of hard, brittle materials. The design, construction, and operation of an improved tester are described. The most satisfactory indenter materials have been found to be diamond, sapphire and titanium diboride; the latter is not available commercially in single-crystal form. 12 illustr, 7 ref. *D* *Nd Wghd*

A. E. I. Research Laboratories—Harlow

Anon. *Instrum Pract* 1960 Vol 14 (7) pp 779-781 (July)

The metallurgy section is equipped with all necessary instruments for hardness and other types of testing. 2 illustr. *D* *Bf Cv Wgh*

Sampling lengths or roughness widths for the measurement of surface roughness. Die Bezugsstrecke oder Bezugslaenge fuer die Rauheitsmessung

E. Bickel. *Werkstattstechnik* 1960 Vol 50 (6) pp 294-301 (June) (In German)

13 illustr, 7 ref. *A* *Cx.21*

TRUING OF GRINDING WHEELS

A list of practical suggestions to help you get the most from your diamond dressing tools

New York Diamond Tool Co Inc. *Carbide Engng* 1960 Vol 12 (7) p 13 (July)

A list of ten rules stressing the importance of proper handling of diamond tools if full use is to be made of their potentialities. Particular emphasis is laid on the fact that while diamond is the world's hardest material, this very property makes it brittle, and care must be taken to ensure that the diamond is not damaged in use. *D* *Nj.138*

LITERATURE REQUESTS
Please quote the page number of the journal which contains the original reference, and the author and title of the article, in all cases.

Grinding techniques

Anon. *Mod Mach Shop* 1960 Vol 32 (11) p 120 (Apr)

Crush forming techniques used with both centreless and centre grinders are given as examples of new developments in the machine tool industry. In conjunction with the centreless grinders, crush truing has made new markets available. Crush grinding steps up production by eliminating turning problems and combining several steps in one operation.

K *Abb Cgj/Chcbc/Chcc*

Wheel dresser saves time

Eight Mile Industries Inc. *Tool Engr* 1960 Vol 44 (7) p 90 (June 15)

The unit, designed for radius and tangent-radius truing, is a permanent part of the grinder and thus saves money, especially where truing is repetitive. Since the work need not be disturbed, increased accuracy also results. Adaptation of unit to grinder is provided by a slide assembly mounted on the wheel spindle. The assembly gives two-directional movement to the truer. 1 illustr. *D* *Ab Cg Pf Psf*

New form grinding, cheaper, faster, closer

H. E. Robison. *Grinding & Finishing* 1960 Vol 6 (5) pp 52-54 (May)

The Tru-Grit rotary diamond-set form truing tool is said to be capable of developing simple or complex forms on any grinding wheel, easily and accurately, to eliminate crush-roll forming for semi-finish form grinding in many instances, and to offer the possibility of fast, cheap, accurate grinding instead of turning to shape when processing harder metals. The new method is claimed to have eliminated four major grinding problems during over a year's operation: close dimensional tolerances, 'lost' production time, scrapped parts, and cost of truing tools and grinding wheels. By this method, tolerances within 0.0005 in. are kept, truing is done in 2½ sec during non-productive parts of the machine cycle, and one diamond grit wheel lasts at least a year, saving costs and eliminating set-up time. Mode of operation and applications are described. An example quoted is simultaneous cut-off, chamfering and bevelling during production of a hydraulic needle valve by using this tool to true the single wheel. Problems in square grooving have also been solved by use of the Tru-Grit unit. 6 illustr.

D *Ab Cgh Nj*

Angular wheel slide grinder

Cincinnati Milling Machine Co, Cincinnati, Ohio. *Grinding & Finishing* 1960 Vol 6 (5) p 65 (May)

The new Cincinnati Filmatic semi-automatic angular wheel slide grinding machines are specifically designed to combine od and shoulder grinding in a single, fast, automatic cycle. Shoulders and shafts are ground simultaneously, with critical dimensions, angles, and corner radii established at the same time. Automatic behind-the-wheel profile truing provides fast, accurate grinding with or without diamond advance on the last pass. Sizing adjustments as fine as 0.00005 in. on work diameter are possible because of the hydraulic motor drive of the infeed screw, it is said.

L *Ab Cgf Nj*

Studer type FH 450 high-precision surface grinding machine.

Matchless Machines Ltd, 18 Bolton St, London W 1. *Machinery, Lond* 1960 Vol 96 (2484) p 1486 (June 22)

A truing device is built into the grinding head as part of the standard equipment, but a table-mounted diamond dresser can be supplied as an optional extra. 1 illustr. *D* *Chcm Pr:Nj Psf.27*

Lumsden No. 632 2-spindle grinder for brake discs

Lumsden Machine Tool Co Ltd, Hawks Rd, Gateshead-on-Tyne. *Machinery, Lond* 1960 Vol 96 (2404) pp 1475-1476 (June 22)

The machine uses peripheral-type wheels for grinding simultaneously both faces of brake disks, from 9 to 14 in. diameter and with maximum and minimum face widths of 3½ and 2 inch. Steplessly variably infeeds are applied to the wheelhead hydraulically and the thickness of the ground disks is controlled by hydraulically-operated diamond wheel dressers, with steplessly-variable traversing speeds ranging from 2 to 30 m/minute. The dressing attachments are set by a knob so that they come into operation automatically when different numbers of brake disks from 4 to 40, in 7 steps, have been ground. Each dressing attachment can be adjusted in relation to the corresponding grinding wheel, to compensate for wear of the diamond, by means of a separate knob which gives a movement of 0.005 in. for one complete revolution. Spindle speed may be increased as grinding wheel diameter is reduced by wear and truing, so that the peripheral speed may be kept approximately constant. 1 illustr.

D *Ab Cg Nj/Az Chc Pr*

Newall-Keighly type MAC multi-wheel grinding machine

Newall Engineering Co Ltd, High St, Old Fletton, Peterborough. *Machinery, Lond* 1960 Vol 96 (2484) p 1481 (June 22)

The machine is designed for the simultaneous grinding of groups of diameters on components such as camshafts and crankshafts. Each wheel is trued by a separate diamond mounted on the wheel head unit and controlled from the operator's position. Compensation for the reduction in wheel diameter is automatic. Work up to 10 in. diameter and 40 in. length can be taken between centres, and maximum diameter that can be ground with new wheels is 5 inches. 1 illustr.

D *Ab Cg Nj.27*

Technica type ZSM centre hole grinding machine

Adam Machine Equipment Ltd, 4 Grange St, St. Albans, Herts. *Machinery, Lond* 1960 Vol 96 (2484) pp 1490-1491 (June 22)

A diamond wheel truing attachment, mounted on the grinding head, can be readily swung into and away from the working position. During the actual truing stroke, the diamond holder is traversed at an angle to the wheel spindle and is simultaneously oscillated; these combined movements are claimed to ensure that an accurate cone shape is formed on the wheel. 1 illustr. *D* *Ab Cg Nj.27*

Schulz-Hermsdorf gap gauge grinding machine

Emma Schulz, West Berlin; British rep: Stanley Howard Ltd, 73 Devon St, Birmingham 7. *Machinery, Lond* 1960 Vol 96 (2484) p 1493 (June 22)

Type RS795c has two grinding wheels and can finish parallel surfaces from ¼ to 20 in. apart. There are four dressing diamonds for each wheel: one diamond on each side is used for relieving the wheel face, and a second diamond is provided for finish dressing the cutting portion of the wheel. The holders for the finish dressing stones are mounted in slides that can be adjusted along a seating valve on top of the wheelhead. Each slide has a micrometer unit for fine adjustment and incorporates a Carl Mahr Millimess dial-indicator gauge, graduated in 0.00004 in. units. The diamond holders are reciprocated by lever-operated rack and pinion motions for wheel dressing. 1 illustr.

D *Ab Cg Njd Psf Wbd.27*

LITERATURE REQUESTS

Please quote the page number of the Bibliography containing the original reference, and the author and title of the article, in all cases.

Churchill type BW plain grinding machine with automatic truing and sizing

Churchill Machine Tool Co Ltd, Broadheath, Manchester. *Machinery, Lond* 1960 Vol 96 (2484) pp 1486-1487 (June 22)

A feature of machines in the BW range is the fully-automatic grinding and wheel truing cycle, the operation of which is described. The truing medium is a diamond. 1 illustr.

D *Ab Cg Nj.133.27*

Swiss P 341,399 **W. Ladinsky**

(Apr 21, 1955—conv date, France)

Tool with diamonds. Outil diamanté

The truing tool as shown in Fig 1 and 2 is composed of three main parts held together by a clamping screw

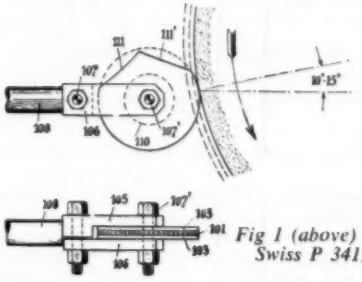

Fig 1 (above) and 2. Swiss P 341,399.

or bolt. The three parts are a central layer 101 and two rigid side plates 103. The central layer 101 carries diamonds which successively come into operation when a diamond has been worn down or torn out of its bond. (5 claims, 9 illustr). *J* *Njd.545*

FP 1,190,676 **A. Fumia, Gleason Works**

(Dec 6, 1956—conv date, USA)

Grinding machine for grinding cutting tools. Appareil de meulage pour la rectification des outils de coupe

The main feature of the machine is the position of the grinding wheel truing device which can be adjusted to true the profile of the wheel, as required by the various cutting angles of the cutters to be ground, so that the angle of the wheel profile coincides with the angle of the cutter profile, but is independent of the length of this profile. The truing tool is a diamond aligned with the axis of the truing device in a position controlled by the tool holder and the shape of the control cam. The tool holder is prevented by the cam from angular movement while it is moved along the axis of the truing device, but when it reaches the desired position, the tool holder moves angularly around this axis. (11 claims, 26 illustr). *J* *Ab Cgf Njb Psf.545*

FP 1,092,421 (Dec 19, 1957) **Wheel Trueing Tool Co**

Apparatus and method for the profiling of grinding wheels. Appareil et procédé de rectification de meules à la forme

The truing tool is designed as the sector of a cylinder with an arcuate abrasive face which is the opposite of the profile to be produced on the grinding wheel. The sector is mounted on a reciprocable crank arm to oscillate the tool about its axis in the same plane as the wheel. The abrasive face contains a layer of diamond particles which may vary from 0.037 mm to 50 per carat. Preferably, there is only a single layer of diamonds of particular density as the tool becomes less precise after a certain amount of use. The reciprocation of the truing sector may be effected by any mechanism using hydraulic, electrical or mechanical means. (6 claims, 2 illustr). *J* *Ab Cgf Nje.545*

PRECISION MACHINING OF METALS

Tools for copy turning
B. Almen. *Tooling* 1960 Vol 14 (4) pp 37-43, 46 (Apr)
Rhombic and rhomboidic inserts are among subjects discussed. Horizontal forces on two commercially available sections for vertical inserts are illustrated, one being a 55° rhombic diamond insert with $\frac{1}{4}$ in. width, and the other a rhomboidic 56° insert with $\frac{1}{4}$ in. cutting edge length and $\frac{1}{4}$ in. width. 15 illustr.
See also *Industr Diam Abstr* 1960 Vol 17 p A69 (Mar).
D *Ceqbz Pf:Nf*

Tips about ceramic tools
George Fischer Ltd, Schaffhausen, Switzerland. *New Scientist* 1960 Vol 8 (190) p 34 (July 7)
It is reported that improvements in ceramic materials have led to an increase in slenderness ratio, *ie* ratio of workpiece diameter to length, of parts that can be satisfactorily turned, from 1 to 6 to 1 to 12, or even 1 to 19 under favourable circumstances. An example comparing ceramic and carbide tool performance is machining a drive pinion made from 40 ton chromium steel. Ceramic tools reduced turning time for 1,000 workpieces from 910 to 570 min, although one ceramic cutting edge machined only 50 parts compared with 120 by the carbide. Nevertheless, total operation cost using ceramic tools was only 76% of the total with carbides, although the ceramic tips cost half as much again as carbide tips. *D* *Pd Rg*Pdd*

The effect of cutting tools on the efficiency of automatic lines
M. Z. Zav'yalov. *Vestnik Mash* 1958 (12) pp 43-46; *LLU Transl Bull* 1960 Vol 2 (7) pp 596-603 (July) (In English, original in Russian)
One factor affecting the efficiency of automatic lines is variation in cutting tool life. Heterogeneity can be taken into account in calculation, if the top limits of the allowances and mechanical properties are taken as a basis. This article gives recommendations, based on experimental data, on the influence of grinding processes on tool life. 6 illustr.
D *Pd Uqe*

Drill symmetry—effects on hole production
W. A. Haggerty (Cincinnati Milling Machine Co). *Tool Engr* 1960 Vol 44 (7) pp 83-86 (June 15)
Abstract of paper No 254 presented at the 28th ASTME Annual Meeting.
When drills are not symmetric, hole production suffers seriously. The specific effects of drill eccentricities on hole quality and drill life has been revealed by a series of tests. The results can be used to improve hole finish, size and location accuracy, and drill life. 7 illustr.
D *Pl Uqe*

How to determine optimum feeds and speeds
R. M. Akers, S. S. Smith. *Tool Engr* 1960 Vol 44 (6) pp 105-109 (June)
The combination of variables resulting in lowest cost machining is suggested, while charts show how cost factors can be plotted without the need for complex mathematics. 2 illustr.
D *Ceq Uqf/Ceq Uqff*

Experimental machining at Custom Tool
R. Williams (Custom Tool & Mfg Co, Minneapolis). *Amer Mach* 1960 Vol 104 (13) pp 121-123 (June 27)
Operations on sintered and arc-cast molybdenum are described. Cutting conditions, coolants, turning conditions, threading and drilling are covered. 5 illustr.
D *Bfq Ceq*

Tool life of single-point tools
C. A. Hadley. *Tool Engr* 1960 Vol 44 (6) pp 117-118 (June)
2 illustr. *D* *P Uqe*

Calculation of drilling time, Pt II
S. K. Bhattacharyya. *Sci & Engng* 1960 Vol 13 (3-4) pp 46-53 (Mar-Apr)
9 tables, 1 illustr, 2 appendices. (Concl).
D *Cfb.1345*

The maintenance of machine tool accuracy—Pt II
F. H. Slade. *Mach Lloyd* 1960 Vol 32 (14A) pp 21-27 (July 9) (In English, French and German)
6 illustr. *D* *Pr Uqez.138*

Rake angles make a difference
Anon. *Carbide Engng* 1960 Vol 12 (7) pp 14-15, 18 (July)
A discussion of the importance and effects of rake angles on small rotary cutting tools. 6 illustr.
X *Pd Uqcc*

Machining deep narrow slots
Anon. *New Scientist* 1960 Vol 8 (192) pp 223-224 (July 21)
Frequent cutter breakage and short life can cause difficulties when milling deep, narrow slots in metal. Russian investigations showed that corner wear should be adopted as the criterion of cutter performance. Other conclusions reached after study of slot milling in steel, cast iron and light alloys are recorded.
D *Bf Cff*

Gadgets [:] Universal drill jig
R. M. Dickson. *Tool Engr* 1960 Vol 44 (6) p 83 (June)
When it is necessary to drill small diameter holes in round parts and production volume does not justify special tooling, the universal jig illustrated can be used. The jig is designed to accommodate shafts up to one inch in diameter, with or without machined shoulders. 1 illustr. *D* *Cfb Pu*

Does gun drilling pay ?
R. E. Delamater (Foote-Burt Co). *Tool Engr* 1960 Vol 44 (6) pp 88-90 (June)
Gun drilling, gun boring and gun reaming are fast and give precision results, but machine tool and fixturing costs are higher than with conventional methods. Some of the economic arguments are discussed. 4 illustr.
D *Cfbn*

Special engineering report : Boring
W. E. Hofiman. *Tooling & Prod* 1960 Vol 26 (3) pp 56-62, 64-68 (June)
A comprehensive article covering methods, machines, and various aspects of boring technique. 12 illustr.
D *Cfd*

Machining pistons for the US Ford falcon engine
Ford Motor Co. *Machinery, Lond* 1960 Vol 96 (2469) pp 551-557 (Mar 9)
12 illustr. *K* *Agg Ceq*

The OS-117 diamond boring machine
E. P. Smotrich. *Biul tekh ekon inform* 1959 (9) pp 29-31; *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (3) p 904 (June) (Original in Russian)
D *Chf Nhz*

Economical chucking with new chuck tools. Wirtschaftliches Spannen mit neuen Spannwerkzeugen
Anon. *Maschinenwelt u Elektrotechnik* 1960 Vol 15 (7) pp 264-266 (July) (In German)
K *P Psh*

Machine prevents workhardening

Anon. *Tool Engr* 1960 Vol 44 (6) p 96 (June)

Machining time on titanium engine castings has been reduced from 4 h to 45 min by adapting a Micro-Path installation to a No 5 Cincinnati vertical milling machine. The unit provides automatic operation while holding tolerance to within 0.003 inch. The use of numerical control is thus said to be a practical and cheap solution to problems resulting from the poor machinability of materials such as titanium, by eliminating cutter dwell which would in turn result in workhardening. 1 illustr.

D *Amz Bfn Cff Pr Wp*

Tape control solves threading problem

Anon. *Tool Engr* 1960 Vol 44 (6) p 98 (June)

Thread milling of studs and other components inaccessible to conventional threading devices can be performed by numerically controlled thread milling. An example quoted is machining a thread to a programmed tolerance of 0.0001 in. on a Numeric-Keller. It also demonstrates the possibility of machining, in a single automatic cycle, workpieces which normally require secondary machining. 1 illustr.

D *Cffk Wpb*

Multi-tool and profiling lathe

Churchill Redman Ltd, Halifax. *Mech World* 1960 Vol 140 (3493) p 357 (Aug)

The 20 × 40 P5 profiling lathe, designed for flexibility, operates on the unit principle so that the construction can be varied as needed to turn out components economically and utilize the advantages of both profile turning and multi-tool turning. A 8 × 15 profiling lathe is also available. *D* *Ceqg Pr*

Constant cutting speed lathe eliminates speed control cams

Lodge & Shipley Co, 3058 Colerain Ave, Cincinnati 25, Ohio. *Mod Mach Shop* 1960 Vol 33 (1) pp 210-211 (June)

A universal Constant Cutting Speed Lathe eliminates the need for speed control cams and computation, thus saving time and money, has a special 3-speed mechanical shift headstock, and a 20 : 1 variable speed drive. Besides greater accuracy and smoother finish, the machine is said to give longer tool life and to minimize tool grinding. The special 'combined feeds' method is claimed to make possible machining capacities substantially greater than on conventional tracer lathes. 2 illustr. *D* *Ceqb Pr*

Rowland type C.0.3 universal abrasive wheel cutting-off machine

Rowland & Co Ltd, Climax Works, Station Rd, Reddish, nr Stockport. *Machinery, Lond* 1960 Vol 97 (2489) p 217 (July 27)

The machine is designed to enable the capacity of modern abrasive cutting-off wheels to be fully utilized. Either a 16 or a 20 in. wheel can be taken on the spindle. The wheelhead can be swivelled up to 45° on one side of the central position for angular cutting. The machine is normally arranged for dry operation but can be adapted for wet cutting. 1 illustr.

D *Pef Pr*

PRECISE milling machines with grinding attachment. PRECISE-Schleiffraeser fuer die moderne Fertigung

Precise Products Corp, Racine, Wisc. *Maschinenwelt u Elektrotechnik* 1960 Vol 15 (7) pp 279-280 (July) (In German)

The machines are accurate to 2.5 μ and can carry out the most difficult work-cycles with a minimum of wear on the milling cutters and the grinding wheel, it is claimed. 2 illustr. *K* *Cff Pr Psc:Pe*

Carbide cutting rings lower honeycomb panel machining costs

Rohr Aircraft Corp, Chula Vista, Calif. *Mod Mach Shop* 1960 Vol 33 (1) pp 172, 174, 176 (June)

See *Industr Diam Abstr* 1960 Vol 17 p A188 (Aug).

D *Bfdb Cej Pdc*

New O-AC 'miniaturized' automatic chucking machine

Warner & Swasey Co, 5701 Carnegie Ave, Cleveland 13, Ohio. *Tooling & Prod* 1960 Vol 26 (3) p 52 (June)

The fourth and smallest of the company's line of versatile automatic chucking machines is said to hold exceptionally close tolerances and to produce fine finishes. Set-up and change over from job to job is quick and easy, while flexibility allows a wide range of work to be handled with relatively simple, low cost tooling. Specifications are given. 1 illustr.

D *Chm Prs Psh*

Warner & Swasey announces turret lathes, chuckers

Warner & Swasey Co, 5701 Carnegie Ave, Cleveland 13, Ohio. *Amer Mach* 1960 Vol 104 (13) pp 146-147 (June 27)

Describes the Servofeed and 4-A turret lathes, Model 1AC single spindle chucker, the O-AC chucking automatic, and the No 2 Micro-Cut turret lathe. 5 illustr. *D* *Ceqb Pr*

Why use hand-operated tracer machines ?

F. Rossberger (Friedrich Deckel, Munich). *Tool Engr* 1960 Vol 44 (7) pp 111-112 (June 15)

The Deckel hand-operated copy miller is said to be capable of accuracy to ±0.0005 in., with good surface finish and economy, when machining complex three-dimensional dies. A variety of attachments contribute to the machine's versatility. It is stressed that though automatic traces and numerical control are good tools for such work, the pantograph is also satisfactory and should not be overlooked. 4 illustr.

D *Ax Cff Pr*

Analogue system gives machine control to ±0.0002 in.

Anon. *Metalworking Prod* 1960 Vol 104 (28) pp 73, 75, 77 (July 13)

Describes the Teledictor electronic machine tool control, illustrating its flexibility by explaining its use in cutting a slot and cutting and drilling holes. The control was demonstrated at the I.E.A. Exhibition, Olympia, on a J. & S. 1216 miller, contour milling Diaform templates to ±0.0005 inch. Control accuracy is ±0.0002 inch. 5 illustr. *D* *Pr Wpz*

Caser type T.A. 26 automatic lathe

Henderson & Keay Ltd, 189 Pitt St, Glasgow C.2. *Machinery, Lond* 1960 Vol 87 (2489) pp 218-219 (July 27)

With a capacity for handling bar stock up to 1 in. diameter, the lathe can be supplied with a maximum of five infeed slides mounted in dovetail guideways, and with micrometer adjustment for accurate tool setting. A longitudinal slide attachment is also available. The operation of the lathe with various attachments is described. *D* *Ceqb Pr*

An eccentric saw

Sir James Farmer Norton & Co Ltd, Salford. *New Scientist* 1960 Vol 8 (193) p 285 (July 28)

A new high speed machine, which exploits the possibilities of a patented, internally-toothed saw, is designed to cut tubes without the external flash or burr often produced by conventional saws. The mode of operation is explained. Ferrous or non-ferrous tubes up to 4 in. od can be cut at speeds up to 3,000 ft/minute. *D* *Pcz*

Machine tools and equipment

J. L. Jameson. *Times Rev Ind* 1960 Vol 14 (162) p 33 (July)

The Jameson hydraulically-operated twin-head fine boring machine can handle a maximum length of 5 ft 7 inches. Workpieces from 1.5 to 11.75 in. diameter can be gripped by inter-changeable jaws which are mountable on the hand-operated self-centring vices. Different types and sizes of boring heads can be provided to suit requirements. The application of the machine is described. 1 illustr.

L *Cfdb Prx*

Lathe, drilling machine have numerical control

Cincinnati Lathe and Tool Co. *Canad Mach* 1960 Vol 71 (2) pp 118-119 (Feb)

The Acramatic control, a unit developed to hold tolerences with great precision, has been designed into a work-positioning table mounted on a Cincinnati sliding head drilling machine. Accurate positioning of the work is done automatically by the positioning table to tolerances of 0.002 inch. Thus, the operator can concentrate on the actual drilling operation. 2 illustr.

D *Ceqb Pr Wpz/Cfb Pr Wpz*

Tool lathe

Milo Mfg Co, 259 N Broad St, Elizabeth, NJ. *Tool Engr* 1960 Vol 44 (6) pp 150-151 (June)

Finishes of less than 1 micro-in. can be produced with a lathe for use with diamond, ceramic, or carbide tools. Movement of the spindle is 15 in. and rigid construction is claimed to eliminate vibration and ensure accuracy. Capacity is 8 in., distance between centres is 28½ in., and spindle speeds range from 250 to 2,920 rev/minute. 1 illustr.

D *Ceqb Nf Pr/Ceqb Pdc Pr/Ceqb Pdd Pr*

Gang of 121 thin saws speeds slotting at IBM

International Business Machines Corp, Kingston, NY. *Carbide Engng* 1960 Vol 12 (3) p 18 (Mar)

With tungsten carbide thin saws a feed rate of 1 to 1½ in./min is obtained. The blades are set radially at random to eliminate chatter and reduce horsepower requirements. 1 illustr.

A *Cej Pcc Rgd*

A **machine tool of great universality.** Eine Werkzeugmaschine hoechster Universalitaet

Meyer & Burger AG, Steffisburg, Switzerland. *Technica* 1960 Vol 9 (12) p 714 (June 3) (In German)

The new UW1 universal machine tool is especially fitted for use in laboratories and experimental workshops, while its high production capacity makes it suitable also for small and medium-sized workshops. It can carry out a wide variety of turning, milling and boring operations with a high degree of accuracy. 2 illustr.

K *Prm*

A **preview of the principal machines of various types to be displayed [:] Gear cutting and finishing machines**

Anon. *Machinery, Lond* 1960 Vol 96 (2483) pp 1401-1406 (June 15)

Exhibits at Olympia are reviewed under the following headings: (*i*) gear hobbing and milling machines; (*ii*) bevel gear generating machines; (*iii*) gear and spline grinding machines; and (*iv*) gear shaving and finishing machines. 3 illustr.

D *Ad Ceg Pr.27/Ad Chm Pr.27*

A **preview of the principal machines of various types to be displayed [:] Lathes and boring mills**

Anon. *Machinery, Lond* 1960 Vol 96 (2483) pp 1326-1350 (June 15)

Exhibitors at Olympia are listed alphabetically under various headings according to the type of machine exhibited, which are described in brief. 19 illustr.

D *Ceqb Pr.27/Cfd Pr.27*

A preview of the principal machines of various types to be displayed [:] Sawing and cutting-off machines

Anon. *Machinery, Lond* 1960 Vol 96 (2483) pp 1409-1414 (June 15)

Brief descriptions of products shown by exhibitors at Olympia, listed alphabetically, are given under sections: (*i*) circular sawing machines; (*ii*) hack sawing machines; (*iii*) band sawing machines; (*iv*) sawing and filing machines; and (*v*) special cutting-off machines. 5 illustr.

D *Cegc Pr.27/Cej Pr.27*

A preview of the principal machines of various types to be displayed [:] Drilling and boring machines

Anon. *Machinery, Lond* 1960 Vol 96 (2483) pp 1386-1401 (June 15)

Alphabetical lists of exhibitors at Olympia, with brief descriptions of exhibits, divided into various sections including: jig boring and grinding machines, horizontal and vertical fine borers, multi-spindle and special purpose drilling machines, and radial and bridge-type drilling machines. 7 illustr.

D *Cfb Pr.27/Cfd Pr.27*

Olympia in close-up—2

Anon. *Machinery, Lond* 1960 Vol 97 (2489) pp 210-216 (July 27)

Photographs and captions illustrate various set-ups and design features at the recent International Machine Tool Exhibition. 21 illustr.

D *.27*

Swiss P 341,429 **G. Lefèvre, Soc Mo Na Cor**

(Nov 2, 1955—conv date, France)

Drilling machine, in particular for hard metals, industrial stones, drawing dies and watch jewels. Machine à percer notamment les métaux durs, les pierres industrielles, les pierres pour filièrs et les pierres d'horlogerie

A series of tool spindles is arranged in a circle on a rotary support. A balance lever is mounted under each of the spindles to keep the workpiece to be drilled under appropriate pressure against the tool. A switch is actuated when a hole has been pierced, whereupon the support turns; a new workpiece may be fed into position while the support is momentarily stationary. The blanks are fed automatically into their holder to replace a finished piece, which is also automatically discharged. The tool spindles rotate at 30,000 to 100,000 rev/minute. A small quantity of abrasive paste is deposited on the workpieces before they are mounted in the machine. (7 claims, 3 illustr).

J *Cfb Pr.545*

FP 1,189,923 **Commonwealth Scientific and Industrial Research Organisation**

(June 25, 1956—conv date, Austria)

Method and apparatus for machining cylindrical bars or holes. Procédé et appareil pour l'usinage de barres ou de trous cylindriques

The method has been developed for the high precision turning of brass bars to be used in the manufacture of diffraction gratings. The usual arrangement when turning a bar on a lathe with a diamond tool consists in mounting the bar between centres and the tool on the tool slide. The resilience of long bars and vibrations resulting from irregularities make it impossible to produce surfaces of the desired precision and finish. The disadvantages are overcome by mounting the tool on a resilient support rotatably arranged on the workpiece, so that the distance between the tool and the axis of the workpiece remains independent of the irregularities of the surface to be worked and of the position of the workpiece with regard to an exterior datum. (9 claims, 8 illustr).

J *Agz Bfxg Ceqbb Nf.1456.545*

CUTTING & MACHINING OF STONE, ETC

Method for measuring the dielectric constant of ferroelectric ceramics at S-band frequencies

C. B. Sharpe, C. G. Brockus. *J Amer ceram Soc* 1960 Vol 43 (6) pp 302-305 (June)

Experimental equipment and procedure are described. The disk-shaped samples are fabricated by using a diamond wheel to cut a ceramic sheet from the rough sample stock to the required thickness. Surface grinding to 0.019 in. follows and after other operations the individual samples are ultrasonically cut from the sheet. Other stages are explained. 6 illustr, 8 ref.

D *Bl Ceg Nvc/Bl Ueb Vfd.1456*

Crystallization of silica on polished glass surfaces

P. de la Cierva, F. de Andrés. *J Amer ceram Soc* 1960 Vol 43 (6) pp 306-313 (June)

Among experiments done was the microscopic examination of samples of SK6 optical glass at all stages of grinding and polishing. 22 illustr, 15 ref, 1 table. *D* *Bm Chc Vj/Bm Chm Unf:Rl*

Unusual etch pits in quartz crystals

J. W. Nielsen, F. G. Foster (Bell Telephone Laboratories, Inc). *Amer Min* 1960 Vol 45 (3-4) pp 299-310 (Mar-Apr)

Several crystals were etched in 48% hydrofluoric acid for 48 h at room temperature. One crystal, of natural quartz, was cut so that two basal planes were parallel, five of the prism faces being neither cut nor polished. The sixth prism face was trimmed with a diamond saw. 8 illustr, 14 ref.

D *Bcb Cej Ng/Bcb Ql Scbf*

Grinding ceramic materials with loose abrasives. Das Schleifen von keramischen Materialien mit losem Schleifmittel

T. P. Kapustina. *Steklo i keramika* 1959 Vol 16 (6) pp 18-21; *Glas-Email-Keramo Techn* 1960 Vol 11 (6) p 215 (June) (Original in Russian, abstr in German)

A *Bl Chc Rdb*

Precision boring of pearls. Exaktes Perlenbohren

Lau. *Dtsch Goldschmiede-Ztg* 1960 Vol 58 (6) p 316 (June) (In German)

The pearl must be held in a special clamp and a 0.6 mm spiral drill of HSS or a half-cylindrical drill used. 1 illustr. *A* *Bz Chdb*

New lapidary products

Anon. *Mineralogist* 1960 Vol 28 (2-3) pp 39-40 (Feb-Mar)

It is felt that the greatest present need is for the development of a less costly new type of saw blade which would be an improvement on the standard circular diamond saw. A hack saw diamond charge blade adapted to lapidary work would cut faster than the circular saw, it is stated, and the friction caused when sawing large masses by the latter type would be almost eliminated. Power tools suitable for operating a hack saw diamond blade are already on the market, and the authors draw the attention of diamond saw manufacturers to this fact. *D* *Ns*Nt*

DIAMOND TECHNOLOGY

First published 1942 as "Production Methods for Diamond and Gemstone." The second edition of this book by P. Grodzinski has been revised throughout and considerably enlarged. 840 pages, 486 illustrations, 94 tables, and indexes. From NAG Press Ltd., 226 Latymer Court, London W 6. 55s 0d, post free.

GEM POLISHING

The gemstone expert recommends. Der Edelsteinfachmann empfiehlt

E. Morlock. *Dtsch Goldschmiede-Ztg* 1960 Vol 58 (7) pp 376-379 (July) (In German)

Deals with the cleavability of precious stones. The diamond can be cleaved in the direction of the octahedral plane, and before the discovery of sawing this was the only means of dividing large stones into smaller pieces. Recommendations for avoiding damage to stones during cutting and polishing are given.

K *F Hld/F Hp*

ROCK DRILLING

Diamond drilling in soft to medium hard rocks

R. Petelle, L. Bath. *Bull Ass Franç Tech Pétrole* 1959 (138) pp 1153-1171 (Nov); abstr *J Inst Petrol* 1960 Vol 46 (436) p 123A (June) (Original in French, abstr in English)

The main drilling problem was the penetration of thick beds of anhydrite alternating with clay or salt. Tricone bits advanced in this at about 1 m/h and had a life of 15-20 hours. Clogging of the teeth was common: diamond bits of 8½ in. diameter were therefore used. With the latter it was found that 850 m of hole could be drilled in 13 days, compared with 26 days taken by tricone bits. The larger bit also penetrated more rapidly than the tricone.

A *Bn Cfb Nhb*

Revolutionary jig may solve some old drilling problems

E. McGhee. *Oil Gas J* 1960 Vol 58 (1) pp 48-49 (Jan 4); abstr *J Inst Petrol* 1960 Vol 46 (437) p 97A (May)

A drilling technique designed primarily for exploration is under field trial. Continuous diamond coring is achieved using a power swivel and reversed circulation to pump core to surface. The drill string consists of two concentric pipes, with provision for circulation down the annulus and up the centre; when possible, air is the drilling fluid, but the space between the drill string and the hole is filled with mud. Long bit life and few round trips are expected, while power requirements of rotary drive and pumps are exceptionally low.

A *Cfb Nhe*

Development of South African mining methods

R. A. L. Black. *Optima* 1960 Vol 10 (2) pp 65-77 (June)

The use of diamond drilling is traced. Since 1945, millions of feet of diamond drilling from surface have been done, and in the process great advances have been made in technique. These include methods of controlling the direction of boreholes and deflecting them at will thousands of feet below surface; better borehole survey instruments; better designs for core barrels; and general improvements to drilling machines and tools. 8 illustr.

D *Cfb Nh.132.361*

Needed now: a better understanding of the basics of earth boring

L. W. Legerwood jun. *Oil Gas J* 1960 Vol 58 (19) pp 127-140 (May 9)

Among drills evaluated are rotary, percussive and turbo-drills. It is concluded that further research on fundamental drilling is required. 23 illustr, bibl.

A *Bnt Cfbd*

A year of turbo-drilling (1957-1958)

J. Reynal. *Rev Inst Franç Pétrole* 1958 Vol 13 pp 1553-1562; abstr *J Inst Petrol* 1959 Vol 45 (431) p 229A (Nov) (Original in French, abstr in English)

Indications of the best methods of turbo-drilling are given. In compact marly-limestones, diamond bits operated 452 m with the turbo-drill and 140 m with the rotary drill, but advance rate was less than for tricones. Other comparisons are made.

A *Cfbd.1456*

Deep drilling technology at the 3rd European Congress on Petroleum Equipment, Paris, June 22-25, 1959. Tiefbohrtechnik auf dem 3. Europaeischen Kongress fuer Erdoelausruestung, Paris 22. bis 25. Juni 1959

P. Waldt. *Erdoel u Kohle* 1960 Vol 13 (6) pp 411-412 (June) (In German)

Among the papers given were 'The development of the turbo-drill and advances in its application' by B. Dagallier and G. Lagacherie of the Société Neyrpic; and 'The economy of the use of diamond tools in deep bore holes' by J. F. Renard of SA Diamant Boart.

K *Cfbd Pl.132/Cfd Nh*

Planned mud program cuts drilling costs

K. D. Tanner, G. B. Gray. *Oil Gas J* 1960 Vol 58 (20) pp 172-173, 175-176 (May 16)

4 illustr, 24 ref. *A* *Cfb.252*

Phenomena affecting drilling rates at depth

A. J. Garnier, N. H. van Lingen. *J Petrol Tech* 1959 Vol 11 (9) pp 232-239 (Sep) (AIMME Tech Paper No 8080); abstr *J Inst Petrol* 1960 Vol 46 (437) p 98A (May)

A *Cfb.21*

The possibilities of extending turbo-drilling to drilling for water

R. Rouvière, W. Tiraspolsky. *Rev Inst franç Pétrole* 1958 Vol 13 pp 1547-1552; abstr *J Inst Petrol* 1959 Vol 45 (431) p 229A (Nov) (Original in French, abstr in English)

A *Bz Cfbd.1456*

Development and field use of a high-frequency gas-operated rotary-percussion drilling tool

G. C. Howard, R. P. Vincent, L. B. Wilder. *J Petrol Tech* 1960 Vol 12 (5) pp 20-26 (May)

4 illustr, 3 tables, 2 ref. *A* *Cfbr Pl*

Effect of bit weight on drilling rate

P. L. Moore, C. Gattin. *Oil Gas J* 1960 Vol 58 (21) pp 90-93 (May 23)

Previous papers have been examined and some new data is provided. In tests for the formation of 'force-time charts' a weighted bit was dropped from various heights to strike a specimen below. The energy of the blow is calculated. It is not certain whether bit horse-power or impact force is the important variable. Equations are provided as a help to the problem.

8 illustr, 8 ref. *A* *Cfb.21*

Is the oil industry accepting turnkey slim hole drilling?

J. W. Arnold. *World Oil* 1960 Vol 150 (7) pp 140-143 (June)

Tools for logging and testing in slim holes include diamond coring equipment available in three hole sizes.

4 illustr, 4 ref, 5 tables. *D* *Cfb Nhe*

Construction problems for turbo-drills

R. A. Ioanessian. *Rev Inst franç Pétrole* 1958 Vol 13 pp 1615-1621; abstr *J Inst Petrol* 1959 Vol 45 (431) p 229A (Nov) (Original in French, abstr in English)

A *Cfbd.21*

Penetration rate of diamond core bit

K. Sasaki, N. Yamakado, Z. Shiohara, M. Tobe. *J Min Inst Japan* 1960 Vol 76 p 75; *Insdoc List* 1960 Vol 7 (8) col 750 (Apr 16) (Original in Japanese)

D *Cfb Nhe.1345*

Bit temperatures in rotary drilling

J. E. Whitbread. *Colliery Engng* 1960 Vol 37 (431) pp 25-29; abstr *Glueckauf* 1960 Vol 96 (10) p 647 (May 7) (Original in English, abstr in German)

Experiments were performed using bits fitted with a thermoelement in order to measure the temperatures reached by the carbide inserts, and so discover the connection between bit form, drilling conditions, and temperature. *A* *Cfbr Pl Vb*

News from the factory & field [:] Drill hole circulating pumps

Anon. *'Mindrill' Bits & Pieces* 1960 Vol 13 (2) p 4 (Apr)

Piston pumps equipped with variable volume high pressure transmission and a closed circuit circulating system give considerable saving of diamond bit expense in exploratory drilling. Abrasion resistant ceramic liners and the ball-valve assembly make it possible to circulate drill mud effectively.

A *Chb.Nhb Pz*

News from the factory & field [:] 'W' series drill rods

Anon. *'Mindrill' Bits & Pieces* 1960 Vol 13 (2) p 4 (Apr)

The advantages of these rods over older types are given. *A* *Plz*

Four-drift rock drilling

Climax Rock Drill & Engng Ltd. *Mech World* 1960 Vol 140 (3493) p 316 (Aug)

A mobile drilling machine is revolutionary in that four drifters can be operated simultaneously by two operators, without fatigue and over long periods, and are capable of drilling a rock face from ground level up to 32 ft high and with a horizontal span of 24 feet. Tungsten carbide tipped 2¼ in. Holbits are used and drilling speeds of 16 in./minute are expected. 1 illustr.

D *Bn Cfb Pr*

This month in mining [:] Alaska

Anon. *Engng Min J* 1960 Vol 161 (6) pp 328, 330 (June)

Bear Creek Mining Co have done over 27,000 ft of diamond drilling to depths as great as 1,600 ft at a cost of about $7/foot. *D* *Cf Nh.342*

GRINDING AND POLISHING OF CARBIDES AND METALS

Checking the dimensions of work machined on centreless grinders

E. Szombathy. *Measuring & Automatic Control* 1959 Vol 7 (8-9) pp 232-236; *Hung Tech Abstr* 1960 Vol 12 (1) p 33 (Original in Hungarian)

D *A Chcc Vfd*

Development in machine tools

L. Sanderson. *Tooling* 1960 Vol 14 (6) pp 65-69 (June)

A general article mentions automatic sizing employed on grinding machines for internal and external work. In the case of internal grinding, both sizing by gauge and sizing by diamond dressing of the wheel are used.

D *Ab Cgz Nj/Ab Cgz Wbb*

Semi-automatic grinding of drill crowns. Halbautomatisches Schleifen von Bohrkronen

Anon. *Bergbautechnik* 1960 Vol 10 (1) pp 38-39 (Jan) (In German); *Gornoi J, Moscow* 1969 (1) pp 74-76 (In Russian)

In the Kriwoj Rog, thousands of rotary drill bits are used and ground each month, giving rise to the development of a new machine for grinding drill bits which has a spindle with two grinding wheels, an emery (Schmirgel) wheel, and a cast iron wheel for electromechanical grinding. Fifteen drill crowns may be fixed in the disk-shaped workpiece holder, arranged so as to have their cutting edges at equal distances from the centre of the disk. The average linear speed of the grinding wheel surface is about 15 m/second. The holder-disk turns at a rate of 3 rev/min and when the wheel and disk are revolved together the fifteen crowns are automatically ground on one side. The whole disk holding the workpieces is then reversed and the crowns are ground on the other side. The finish obtained by semi-automatic grinding is superior to that obtained by hand. 2 illustr.

A *Alb Chc Prsb*

Diamond abrasive eases metallographer's task

E. C. Olden (Pitman-Dunn Laboratories Group). *Steel* 1960 Vol 146 (6) pp 80-81 (Feb 6)

A series of metal specimens were prepared with a carefully sized diamond abrasive: this prevented edge rounding, which would occur under the use of conventional abrasives, retained the non-metallic inclusions, and reduced surface distortion. Specimens were rough polished with silicon carbide before the intermediate polishing with a spiral-cut wax wheel rotating at 360 rev/min and using a 600 grit silicon carbide paste, and the diamond polishing was in two stages, the coarser paste being 5-8 μ and the finer 0 to 1 micron. A final polish with magnesium oxide or levigated alumina removed superficial scratches resulting from the diamond polishing. 9 illustr.

A *Bfa Chm Kmg*

Grinding problem ? Try a bur

Ludwig Manufacturing Co, Racine, Wisc. *Carbide Engng* 1960 Vol 12 (7) p 19 (July)

Describes how the problem of grinding or milling an edge on a stainless steel strip, from which cutter blades were to be formed, was solved by designing a special set-up to mill the strip continuously with a ¼ in. carbide burr, in coniunction with a Dumore high speed hand grinder. 2 illustr.

D *Bfdb Chc Peb Rg*

Development in tooth-edge grinding machines for face wheels. Entwicklungen an Zahnflanken-Schleifmaschinen fuer Stirnraeder

H. Kreisel. *Z Ver Dtsch Ing* 1960 Vol 102 (17) pp 695-696 (June 11) (In German)

The modern method of grinding cog wheels is described, in which the two grinding wheels are fixed in a perpendicular position, the width between them being determined by the size of the teeth on the workpiece. The method may also be applied to the production of grooved wheels. 10 illustr.

A *Adz Chc Pr.132*

Where to start grinding molybdenum

J. A. Mueller. *Amer Mach* 1960 Vol 104 (13) p 124 (June 27)

Molybdenum is fairly easy to grind: being basically soft, conventional machines, standard feeds and speeds can be used. Unalloyed molybdenum is easier to grind than alloyed grades. A sharply dressed soft grade wheel and plenty of coolant are advised. A table shows a wide range of recommendations. 1 illustr, 1 table.

D *Bfq Chc.1456*

Automation in the construction of apparatus and in precision engineering. Die Automation im Apparatebau und der Praezisions-Industrie

Anon. *Maschinenwelt u Elektrotechnik* 1960 Vol 15 (7) p 278 (July) (In German)

Rondelling is recommended for bearing supports which have to be precision machined and polished to a high surface finish. This process can be carried out with sintered carbide or ceramic wheels of different hardness and grain size. The finish grinding is done with diamond wheels and is of great importance.

K *Ayz Chcf Pe/Ayz Chct Nv*

Automatic infeed of cylindrical workpiece on a grinding machine

P. G. Stroganov, V. V. Rjumin. *Prom Energet* 1959 Vol 14 (11) pp 26-27; *Inhaltsverzeichnisse sowjet Fachzeits* 1960 Vol 9 (2) p 148 (Feb) (Original in Russian)

A *Ag Chc Pr*

Developments in automatic grinding

J. H. Church (Sigma Instrument Co Ltd). *Control* 1960 Vol 3 (24) p 124 (June)

Discusses a Sigma control system whereby fully automatic operation is achieved by combining the size-control with automatic dressing and re-positioning of the grinding wheel. The reliability and simplicity of the system has led to its applicaton to surface grinding as well as centreless grinding.

D *Chcc.133/Chcm.133*

Grinding hard-alloy metal-cutting tools

A. P. Chernousenko. *Mashinostroitel* 1959 (12) pp 10-12 (Dec); *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (3) p 935 (June) (Original in Russian)

D *Al Bfx Chc*

New lapping techniques

Anon. *Izv vys ucheb zav mashinostr* 1958 (11-12) pp 226-227; *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (3) p 935 (June) (Original in Russian)

D *Chd.1456*

Taylor wet-belt centreless grinder

Anon. *Metalworking Prod* 1960 Vol 104 (30) p 65 (July 27)

This grinding and polishing machine for the centreless finishing of metals and non-metals will remove up to 0.010 in./pass and finish at 25 ft/minute. The machine can also be arranged for plunge and through feed grinding and has a grinding capacity from ¼ in. to 2½ in. diameter. Belt abrasive is in grit sizes from 36 to 400 and the belt is held against the wheel by a 5 in. diameter contact wheel rotating on a dead spindle. 1 illustr.

D *Chcc Pr*

Michigan type 999 abrasive hardened-gear finishing machine

Michigan Tool Co; British rep: Gaston E. Marbaix Ltd, Devonshire Hse, Vicarage Crescent, London SW 11. *Machinery, Lond* 1960 Vol 96 (2484) pp 1526-1527 (June 22)

As well as removing nicks and burrs from teeth of hardened gears, the machine will correct small dimensional inaccuracies resulting from heat treatment, together with variations in tooth spacing, involute profile, and helix angle. A gear-type abrasive tool with helical teeth is used, being held in close contact with the work by an adjustable air-operated arrangement. The tool is of a special plastic material impregnated with grit. Various grades and sizes of grit can be supplied accordingly to needs. 1 illustr.

D *Adz Chm Pr.27*

Small horizontal grinders introduced by Buckeye

Buckeye Tools Corp, 5003 Springboro Pike, Dayton 1, Ohio. *Amer Mach* 1960 Vol 104 (13) pp 150-151 (June 27)

The 31G-520 and the 31G-720 are 10 in. long, weigh 40 oz and operate at 20,000 rev-minute. The difference between the two models is in the throttle : the 520 has a lever type, and the 720 a lock button. Principal application is die grinding, but deep hole grinding is possible and the tools may be adapted for use with rotary files, cutters, and small mills. Accessories are listed. *D* *Chcz Pr*

Twist drill grinder

Associated American Winding Machine Inc, 750 St Ann's Ave, New York 56. *Tooling & Prod* 1960 Vol 26 (3) p 119 (June)

The new KBS-6 Meteor sharpens milling cutters and right and left-hand twist drills from 0.008 in. to 0.236 in. and up to 6¼ in. long. Point angle is adjustable from 90 to 180°, relieving from 0 to 20°, and a high precision 4-jaw chuck allows instant clamping and unclamping. 1 illustr. *D* *Albz Chc Pr*

Giant rotary surface grinder applies 125 hp through quick-tilting spindle

Mattison Machine Works, Rockford, Ill. *Amer Mach* 1960 Vol 104 (13) p 145 (June 27)

Model 60 Quick-Tilt vertical rotary surface grinder can take extra large piece parts for rough and finish grinding in a single operation. Productivity is increased by some 50% over conventional methods since 125 h.p. is applied through the spindle. The selector switch activated power spindle is said to be unique for this class of machine tilting. 1 illustr.

See also *Industr Diam Abstr* 1960 Vol 17 p A107 (Apr). *D* *Chcm Pr*

Machine grinds curved surfaces

Mattison Machine Works, Rockford, Ill. *Tool Engr* 1960 Vol 44 (7) p 89 (June 15)

Face grinding and contour finish grinding both of male and female contours are combined in one machine through use of an auxiliary swivelling head. The head may be pre-set to any desired angle and in operation it floats laterally and is tracer controlled. Lateral head movements are aided by a combination of counterweighing and anti-friction spindle carriage mounting. 1 illustr. *X* *Chcz Pr*

Precision Gear show Red Ring honer

Precision Gear Machines & Tools Ltd, Coventry. *Metalworking Prod* 1960 Vol 104 (30) p 73 (July 27)

The GHB gear honer is designed to obviate the problem of gear noise caused by nicks, burrs, tooth roughness and minor heat-treatment distortions. Honing is not intended as a substitute for the conventional methods of gear cutting but is the final finishing operation before the gears are assembled. The honing tool is a relatively hard abrasive-impregnated plastic gear, the abrasive grain size depending on stock removal and surface finish requirements. Up to 0.002 in. of stock can be removed with surface finishes in the order of 10 micro-inches. Cycle times of less than 1 min are claimed to produce low sound-level automotive gears. 1 illustr. *D* *Ad Chh Pr*

REQUESTS FROM AMERICA

American readers who wish to order a photostat or reprint of an article abstracted in Industrial Diamond Abstracts are advised to apply directly to the appropriate journal if this is an American publication.

Orcutt internal helical gear grinding machine

Gear Grinding Co Ltd, Cranmore Blvd, Solihull, Warwickshire. *Machinery, Lond* 1960 Vol 96 (2484) p 1526 (June 22)

Developed in response to requests from the aircraft industry for a machine suitable for accurately grinding annulus reduction gears, the grinder can handle gears with inside diameters of 10 to 24 in., approximately, the minimum and maximum number of teeth being 45 and 240. Minimum normal diametrical pitch is 10 and maximum 5, while the helix angle can vary between 0 and 25° right- or left-hand, depending on the normal pressure angle. A mechanism is described which is claimed to enable the accuracy of the lead of a gear to be held within 0.0001 in. per inch of face width. 1 illustr. *D* *Adz Chcn Pr.27*

Union Carbide lapping and chip-breaker grinding machine

T. S. Harrison & Sons Ltd, Union St, Heckmondwike, Yorks. *Machinery, Lond* 1960 Vol 96 (2484) p 1492 (June 22)

Powered by a ½ h.p. motor, the machine has a 4 in. diameter metal bonded diamond taper cup wheel, which is suitable for both lapping and chip breaker grinding. Worktable is ball bearing and spring mounted, with a 3 in. travel in either direction across the face of the wheel. Coolant equipment is standard and a range of holders and an angular tool setting device are supplied. 1 illustr.
D *Chcz Nvfb Pr.27/Chd Nvfb Pr.27*

Landis Lund 16- by 32-in. type DH crank-pin grinding machine

Landis Lund Ltd, Cross Hills, Keighley, Yorks. *Machinery, Lond* 1960 Vol 96 (2484) p 1483 (June 22)

The machine, for grinding crankshafts at high production rates, is the smallest in a comprehensive range of crankpin grinders and will take workpieces up to 36 in. long with a maximum swing of 16 inch. Standard grinding wheel is 36 in. diameter, but 42 in. diameter can be fitted. For truing, the newly developed Landis type R dresser is used, which has a ball slide and which produces the complete 90° corner form at each side of the wheel. 1 illustr.
D *Agn Chc Pr:Pf.27*

Diamond-belt polishing

Anon. *Amer Mach* 1960 Vol 104 (13) p 3 (June 27)

Carbide dies for bar drawing are polished by diamond impregnated nylon belts on Hartford Special machines. Hand polishing costs are cut by 50 : 1 because of much higher production rate. The belts, from 3/16 to ¼ in. wide, are impregnated with 100 to 3,000 mesh diamond particles. The worktable rotates the dies at about 100 rev/min and belt speed is 5,000 ft/minute. Belt life limits have not yet been fully established, but one belt has polished 200 dies.
D *Ax Bk Chm Nvg*

Deburring and finishing machine

Mecha-Finish Corp. *US Industr Dig* 1960 Vol 2 (4) p 11 (Apr)

The machine is designed for low production of many parts, and/or high production of a single component. It has two independently operated spindle heads so that one spindle remains in process while the other is serviced. The unit can also be supplied with spindle stations interlocked. Parts are mounted on spindle fixtures, air-operated, which are submerged while rotating in a fluid abrasive which simulates a form grinding wheel. 1 illustr.
D *Chc Pr/Chm Pr*

Novomatic type ME internal grinding machine with automatic work loading

Fenter Machine Tools Ltd, 184 Aston Rd, Birmingham 6. *Machinery, Lond* 1960 Vol 96 (2484) pp 1485-1486 (June 22)

The machine is provided with automatic sizing equipment which incorporates a diamond-tipped feeler, held in contact with the bore of the work during grinding. Signals from this feeler are transmitted when the rough and finish ground diameters are reached, and thus initiates the withdrawal of the wheelhead. 1 illustr.
D *Ndb Psc Vfd.133.27*

A preview of the principal machines of various types to be displayed [:] Grinding, honing and lapping machines

Anon. *Machinery, Lond* 1960 Vol 96 (2483) pp 1351-1370 (June 15)

Exhibitors at Olympia and brief reviews of products under sections: (*i*) cylindrical, universal and internal grinders; (*ii*) surface grinders; (*iii*) tool and cutter grinders; (*iv*) centreless grinders; (*v*) thread grinders; (*vi*) special grinding machines; (*vii*) floor and band grinders; and (*viii*) honing, lapping and burnishing machines. 10 illustr.
D *Chc Pr.27/Chd Pr.27/Chh Pr.27*

A preview of the principal machines of various types to be displayed [:] Horizontal and vertical broaching machines

Anon. *Machinery, Lond* 1960 Vol 96 (2483) pp 1408-1409 (June 15)

An alphabetical list of exhibitors at Olympia is given, with reviews of exhibits. *D* *Cfm Pr.27*

FP 1,189,469 **S. Messerschmidt**
(Jan 10, 1957—conv date, Germany)

Ball grinding machine. Machine à rectifier les billes

The balls are fed into grooves concentrically arranged in a rotating disk under another disk which is stationary and concentric with the first grooved disk. An eccentric portion of the stationary disk is cut away to accommodate a rotary ceramic grinding wheel composed of a number of grinding rings corresponding to the number of guiding grooves in the rotating first disk. The hardness of the grinding rings varies with their diameter so that the ring with the greatest diameter, and thus with the greatest cutting speed, has the same grinding action as the other rings of lesser diameter and surface speed. (10 claims, 5 illustr).
J *Az Chc Pe Rp:Pr.545*

FP 1,193,348 (Mar 17, 1958) **E. F. Hofmann**

Proximity control and measuring device for use on plane grinding machines. Dispositif de mesure et de commande sans contact, utilisable sur les machines à rectifier les surfaces planes

(2 claims, 1 illustr).
D *Chc Pr Psc Vfd.545*

FP 1,194,238 (Apr 4, 1958) **SA Herckelbout & Fils**

Machines for grinding the ends of helical springs. Machines destinées au meulage des extrémités des ressorts

Two abrasive wheels are used, arranged at an angle to each other with frusto-conical surfaces. The springs are held in apertures in a circle on a rotating disk to pass between the wheels which operate over a segment of the disk, so that the springs are progressively ground on entering the grinding path, until, at the end of the path, the wheels produce finish-ground parallel faces. One aperture of the disk is provided with a truing tool which may be a diamond. (7 claims, 9 illustr).
J *Az Chc Pr:Nj.545*

MACHINING DEVELOPMENTS

Low-cost automation

I. Nickols (Nickols Automatics Ltd). *New Scientist* 1960 Vol 7 (190) pp 24-26 (July 7)

The emergence of new trends in automation is illustrated by descriptions of exhibits at the 1960 International Machine Tool Exhibition. One such trend is towards machines of greater flexibility which can produce complicated parts in small numbers to a high degree of precision: the Archdale vertical co-ordinate drilling machine is considered as an example of this. The great savings such a machine offers is in the preparation of jigs for each job undertaken, the preparation of a tape 'programme' being cheaper and easier. Another significant trend has as its object the production of low cost machines which will give ordinary small engineering shops the opportunity for flexible automatic production. The Wyvern Wyvomatic double headed lathe and the Centec programme-controlled milling machine are taken as examples, while a more ambitious yet simple machine is the Herbert modified 2D lathe. On the latter machine, all normal controls are operated by pneumatic actuators and these in turn are operated from a control console by solenoid valves. The author also describes the conversion of ordinary machine tools to automatic operation by the installation of automatic control equipment. 4 illustr. *D* *Prs*

Machining to one millionth of an inch

Anon. *Financial Times* 1960 (22128) p 13 (July 6)

A new technique for machining metals and other materials which, it is claimed, will be capable of working to a resolution of approximately one millionth of an inch, is being developed as the result of techniques adapted from electron microscope construction. The process, expected to have wide-spread applications in electronic, and eventually in mechanical engineering, involves the use of a technique known as 'electron beam activated micro machining'.
D *Bf Ceq.1456*

Sonic energy as a production tool

T. J. Bulat. *Tooling & Prod* 1960 Vol 26 (3) pp 7-8, 12, 18, 21, 24 (June)

In impact grinding, a cutting tool is driven at sonic frequencies by a transducer. Abrasive particles in a liquid slurry are kept between the cutting head and the surface of the material being cut, the particles being propelled at such force that they will grind their way quickly into very hard substances and reproduce the form and profile of the cutting tool. Irregular shapes can be cut and tolerances of 0.001 in. are easily attained. Heat caused by drill friction is generally eliminated as a factor for consideration.
D *Chc Rdb Vwghz*

Recent developments in tool materials and processes

N. Zlatin. *Mod Mach Shop* 1960 Vol 32 (11) pp 126-133 (Apr)

Typical applications of ceramic and carbide tooling, electrical discharge machining, electrolytic grinding, ultrasonic machining and chemical milling are discussed. 6 illustr. *K* *B P.132/P.132*

New non-destructive electrolytic polishing methods and pressure techniques on metal surfaces. Neuartige zerstoerungsfreie elektrolytische Polierverfahren und Abdrucktechniken auf Metalloberflaechen

P. A. Jacquet. *Metalloberflaeche* 1960 Vol 14 (6) pp 161-170 (June) (In German)
37 illustr, 30 ref. *A* *Bf Chmk/Bf Vc*

Electric discharge deep-trepans molybdenum

Metals Engineering Staff, Picatinny Arsenal. *Amer Mach* 1960 Vol 104 (13) pp 127-128 (June 27)
5 illustr. *D* *Ba Ceqm*

Spark machining symposium : Metallurgical aspects and surface characteristics

H. Opitz. *Metal Treatm* 1960 Vol 27 (177) pp 237-250 (June)
21 illustr, 12 ref.
D *Bf Ceqm Unf.541*

New grinding equipment

Anon. *Diamond News* 1960 Vol 23 (8) p 9 (May)

Electro-chemical grinding equipment, using diamond wheels, has been installed by at least three San Diego area firms for operations on tough metals and sintered tungsten carbide. One estimate is that a diamond wheel which formerly lasted a month should now last ten months in normal use. *D* *Nv Prdz*

Ultrasonic tooling machine dices semiconductor materials

Sheffield Corp, Dayton, Ohio. *Amer Mach* 1960 Vol 104 (13) p 148 (June 27)

An ultrasonic tool for machining operations on hard and brittle materials is suitable for low production requirements but is capable of handling high production needs when necessary. Power is supplied by a 1,000 watt electronic generator, and the tool can machine as many as 300 dice, 0.030 × 0.010 in. thick, in a 1 in. diameter wafer in under 45 sec, it is claimed. 1 illustr. *D* *Ceqr Pr*

Speeds electrical discharge machining

Elox Corp. *Tool Engr* 1960 Vol 44 (7) p 91 (June 15)

A power-supply unit, designed for use with Elox machine tools, enables holes and cavities in die steels to be electrical-discharge machined at rates up to 20 cu. in./hour. The unit is said to give significantly improved wear ratios when aluminium electrodes are used. Increased rate of metal removal makes deep roughing operations possible. When cavities are within 0.060 in. of final size, a smaller power supply unit can be used for the finishing operations. 1 illustr.
D *Ax Bfd Ceqm Ptc*

Automatic co-ordinate setting

Anon. *Mech World* 1960 Vol 140 (3492) p 305 (July)

Describes a patent electronic universal surfacing, boring, milling, drilling, tapping and screw-cutting machine fitted with the A.E.I. two-dimensional co-ordinate setting system. The machine is specially designed to take advantage of the accuracy available from this new electronic control system. 1 illustr.
D *Pr Wpz*

Agemaspark type F500 spark-erosion machine

Adam Machine Equipment Ltd, 4 Grange St, St Albans, Herts. *Machinery, Lond* 1960 Vol 96 (2484) pp 1539-1540 (June 22)

Type F500 has a 20 × 16 in. worktable. The electrode head is mounted vertically, the electrode can be raised and lowered through 9¼ in., and swivelled about a horizontal axis through 30° on either side of the vertical position. It is stated that a working tolerance of ±0.0004 in. and a surface finish of 10 micro-in. can be maintained readily, while a control allows ten additional coarser grades of surface finish to be selected. The smallest hole that can be eroded is 0 008 in. diameter and the largest area 10 sq. inches. Maximum metal removal rate of 0.022 cu. in./min can be maintained. 1 illustr.
D *Ceqn Pr.27*

Spark machining

Anon. *Mach Lloyd* 1960 Vol 32 (12A) pp 24-26 (June 11)

The use of the technique for die-sinking and for machining of hard alloys is discussed and future developments considered. 3 illustr.
D *Ba Ceqm*

FP 1,192,922 AGIE AG fuer Industrielle Elektronik
(Dec 30, 1955—conv date, Switzerland)

Method of removing material by electro-erosion. Procédé d'enlèvement de matières par électro-érosion

Hitherto it was only possible to produce by electro-erosion holes which had the same section along their whole length. It was also possible to manufacture dies, *etc*, in which case the electrode presented the complementary shape of the cavity to be produced. It was however impossible to machine by electro-erosion workpieces with varying cross-sections at right angles to the direction of feed of the electrode. The characteristic feature of the new method is the use of electrodes which either do not rotate or rotate very slowly, and which can execute a second movement during the feed towards the workpiece, deviating from the direction of the straight feeding movement. (38 claims, 24 illustr).
J *Ceqn Ptc.1456.545*

PRODUCTION, GRADING & RECOVERY OF ABRASIVE PARTICLES

The Behr-Manning and Norton Pike story

E. C. Schacht (Behr-Manning Co). *Grits & Grinds* 1960 Vol 51 (3) pp 39-43

Coated abrasives are used for grinding and polishing materials such as metals, plastics and glass. Constant technical improvements include electrostatic deposition of abrasive grains evenly over the backing with the sharp ends upwards, thus greatly increasing cutting efficiency. Abrasive belts may be used for a wide variety of purposes including polishing jewellery, polishing dies to precision tolerances, and imposing accurate compound tapers on the wings of giant aircraft. 3 illustr.
L *Chc Rdg/Chm Rdg*

Products of the electric furnace

H. J. Daly. *Grits & Grinds* 1960 Vol 51 (3) pp 17-19

Abrasives in general are compounds which have been formed at elevated temperatures and synthetic ones may be formed in various types of electric furnaces. Norton Co's Chippawa furnace plants are today the world's largest producers of raw materials for use as abrasives and in refractories, the chief products being Crystolon silicon carbide and Alundum fused aluminium oxides. 2 illustr. *L* *Rdf*

Particle size analysis in routine process control

A. G. Pendleton. *Chem Process Engng* 1960 Vol 41 (4) pp 147-148 (Apr); *Metal Powd Rep* 1960 Vol 14 (9) pp 160-161 (May)

Deals with the construction and operation of the Fisher sub-sieve sizer, and with the evaluation of the results. The instrument embodies the principles of a particle size measuring apparatus used by Gooden and Smith (1940), who employed the air-permeability method for measuring average particle size.
D *Vgf*

Grinding press dies with resin bonded grinding wheels. Das Schleifen von Schwalbungen mit kunstharzgebundenen Schleifkoerpern

A. Kahl. *Bergbautechnik* 1960 Vol 10 (2) pp 98-100 (Feb) (In German, abstr in English)

Natural corundum is the only abrasive material used, but recently resin has been found to have advantage over ceramics as a bond, in grinding the press dies in briquetting plants. Problems of replacing ceramics with resins are discussed.

A *Aj Chc Pe Urb*Aj Chc Pe Urf*

Swiss P 341,400 (Sep 25, 1957) **G. Schaerz Method of manufacturing a bearing element made from a synthetic stone.** Procédé de fabrication d'un élément de palier en pierre synthétique

Usually such elements, *eg* of synthetic ruby, are machined with tools using diamond powder. It has been found that the addition of molybdenum sulphide to the diamond powder produces a surface in which an extremely fine layer of the sulphide is incorporated and this fine layer acts as a lubricant, remaining effective for several years without any necessity of adding oil. A preferred mixture consists of 80 parts (volume) of diamond and 20 parts of a suspension of molybdenum sulphide in oil. (3 claims).

J *Ax Bbb Ceq Km.545*

TOOL PRODUCTION

Borer with hydrostatic drive

National Engineering Lab, East Kilbride; Armstrong Whitworth (Metal Industries) Ltd, Gateshead. *New Scientist* 1960 Vol 8 (191) pp 151-152 (July 14)

A vertical boring machine has been converted to hydrostatic operation during research to determine whether the hydrostatic drive can be applied successfully to machine tool construction. If successful, the application of the principles of hydrostatic transmission in this field could have far-reaching effects on machine tool design by eliminating gear boxes and expensive and bulky electrical equipment, under favourable circumstances. Design of the converted machine is described. Surface cutting speed remains constant throughout operation, despite change in workpiece diameter, thus improving surface finish and increasing efficiency. *D* *Cfd Pr.131*

Nylon for tooling

N. A. Flemming. *Tooling & Prod* 1960 Vol 26 (3) pp 53-54 (June)

Among applications mentioned is the use of nylon for collets and arbors to hold precision steel rings during girnding, honing and polishing operations. Rejects due to scratching the rings on the fixtures were eliminated, while nylon tooling is claimed to have outlasted steel by as much as ten times. The machining of parts from nylon is said to pose few problems, standard metalworking equipment being suitable. Advice is given on points to observe in various operations. 4 illustr. *D* *Ps Ssb*

What you can do with ceramics

H. Frommelt. *Tooling & Prod* 1960 Vol 26 (3) pp 48-50 (June)

An article based on the author's cutting tool research projects while at the Metal Removal Center of the Spring Garden Institute. 4 illustr.

D *Pdd.131*

Aluminium oxide abrasive

Norton Co, Worcester 6, Mass. *Mod Mach Shop* 1960 Vol 33 (1) p 231 (June)

A new tougher aluminium oxide abrasive, 75 Alundum Abrasive, specially developed for stainless steel billet and slab grinding, takes fullest advantage of the higher pressures and speeds used in grinding stainless steels.

D *Bfdb Chc Rj*

Norton products in the space age . . .

W. G. Fallon jun. *Grits & Grinds* 1960 Vol 51 (3) pp 29-33

3 illustr. *L* *Pdd*

Research and development—key to progress

W. L. Howe. *Grits & Grinds* 1960 Vol 51 (3) pp 34-38

High density, high purity Alundum aluminium oxide shapes are being used as tool bits to turn cast iron, steel, and heat treated alloys at higher machining speeds than usual. The tool material is called VR-97. New 75 Alundum abrasive wheels promise to be of great significance for stainless steel billet and slab grinding. In laboratory tests these wheels have shown themselves to be capable of removing twice as much metal per wheel as the best wheels previously used. Synthetic diamonds have been made by Norton but commercial production is not anticipated at present. 2 illustr.

L *Fh Ha/Pdd/Pe Rj*

Grinding wheel manufacturing today

J. Jeppson. *Grits & Grinds* 1960 Vol 51 (3) pp 7-11

Facilities at Norton's newest plants for grinding wheel manufacture are described and a few of the latest manufacturing methods and techniques are discussed, including finishing operations on the face or periphery, the two parallel sides and the arbor hole. 5 illustr.

D *Pe Qc*

Ceramic powders cast cold

Corning Glass Works, Corning, NY. *New Scientist* 1960 Vol 8 (190) p 33 (July 7)

Two new ceramic powders which can be cast at room temperatures for high-temperature tools, jigs and fixtures, seem likely to become an important addition to the range of constructional materials used for tooling purposes, especially in aircraft and missile production. The powders can be moulded to the form required by the user when needed and can be used immediately. The moulded forms are said to be dimensionally stable and to have high compressive strength. The powders are marketed as Corcast and Cortamp.

D *Pdd Qv*

Preventing loading of honing stones

Anon. *Grinding & Finishing* 1960 Vol 6 (6) p 11 (June)

Reply to reader's question.

If the grinding swarf becomes permanently lodged in the surface pores, the honing stone or wheel is said to be 'loaded'. Honing stones are often treated with materials of various characteristics designed to fill the pores or voids between the abrasive grains, thereby preventing the accumulation of swarf. The question of glazing of honing stones is also considered.

E *Chh Pd:Qmb*

Steam treatment improves cutting tool performance

R. F. Novy. *Tool Engr* 1960 Vol 44 (7) p 92 (June 15)

Oxidizing the surfaces of drills, reamers, taps, hobs and other tools in a steam atmosphere can double the life of cutting tools, it is claimed.

D *Pd Uqe*

International conference on 'Precision instrument construction' in Dresden. Internationale Tagung 'Feingeraetebau' in Dresden

G. Boegelsack. *FeinwTech* 1960 Vol 64 (5) pp 188-190 (May) (In German)

Problems of heat occurring in precision instruments, surface inactivity and anti-corrosive surfaces, bearings, treatments, tolerances and welding of cylindrical slide bearings, lubricants for precision bearings and pneumatic bearing are among topics discussed.

A *Az Qc.322*

Precision grinding machines

E. M. Hicks. *Grits & Grinds* 1960 Vol 51 (3) pp 12-16

An outline of the history of the development and production of grinding and lapping machines is given. Some of the most obvious recent developments and additions are touched on. The various types of grinders now made include special purpose ones produced to customers' specific requirements.

L *Chcw Pr*

Grinding machine wheel head and work head assembly

A. A. Jones & Shipman Ltd. *Machinery, Lond* 1958 Vol 93 (2390) pp 530-538 (Sep 3)

One of the most important factors influencing performance is roundness of the wheelhead and workhead spindles. All machine spindles are now ground on a J & S type 1305 cylindrical machine. As received, the spindles are 0.00025 in. oversize, and before they are finish ground, the centres are lapped on a J & S type 1600 lapping machine. For this purpose, a diamond-dressed grade A200-T5 V90 Carborundum mounted point is used. Operations are described. 11 illustr.

D *Ac Cg Nj/Agp Chd Peq Rgc*

FP 1,189,548 **Karl Hueller GmbH**

(Jan 5, 1957—conv date, Germany)

Machine for face grinding. Machine pour le meulage de surfaces frontales

Face grinding machines operating with conical wheels mounted on spindles at an angle to the axis of the workpiece present certain difficulties in the arrangement of the truing device. It is impossible to shift the spindle in the direction of its axis because in known machines this spindle is disposed on a circular table which itself is mounted on a reciprocating carriage. The machines are therefore especially designed, *eg* for ball bearing races, so that one machine grinds the interior faces only while the exterior faces are ground on another machine. On both sides of the workpiece carrier the new grinder has a grinding unit which is adjustable on a slide arranged at an angle to the workpiece axis. Each unit has its grinding spindle parallel to the axis of the workpiece and is also provided with a feeler responsive to the dimensions of the workpiece: this adjusts the return path of the slide and automatically initiates the truing of the wheel. (3 claims, 3 illustr).

J *Chcz Pr Psf.545*

POWDER METALLURGY

Tungsten carbide

A. S. Hester, A. D. Mitchell, R. W. Rees. *Industr Engng Chem* 1960 Vol 52 (2) pp 94-100 (Feb); *Bull Brit non-ferr Met Ass* 1960 Vol 40 (372) p 342 (July)

Manufacture of tool tips, *etc*, by powder metallurgy is included.

D *Bkcb Qt:Pdcb*

Build your own carbide tools

Anon. *Iron Age* 1960 Vol 185 (14) p 104 (Apr 7)

Crystals of titanium carbide are embedded in a stainless steel matrix by powder metallurgy methods. Normal shop tools are used to machine these carbides. 1 illustr.

A *A Bkcc Ceq*

Metallurgy of metal cutting

E. M. Trent. *J B'ham Met Soc* 1960 Vol 40 (1) pp 3-22 (Mar); *Bull Brit non-ferr Met Ass* 1960 Vol 40 (372) p 349 (July)

Discusses properties required of a tool material and the stresses and high temperatures involved: hardness, toughness, wear resistance, and flank wear. Investigations were made into the cratering of tungsten carbide-cobalt alloys, and the effect of adding titanium carbide and tantalum carbide and of cutting speed and temperature. Effect of the 'built-up edge' is also covered.

D *Bf Pd Vwl*

MISCELLANEOUS

E & M J's 1960 Buying Directory

Anon. *Engng Min J* 1960 Vol 161 (6) pp 251-298 (June)

The directory is in three parts: product classification, manufacturers' index, and advertisers' district sales offices. Hard metals, diamond concentrating equipment and industrial diamonds are among products listed.

D *Cb.56/F Hd.56*

Catalogue of machine tools

R. Jelinek. *Buchneuerscheinungen aus den volksdemokratischen Laendern* 1960 (28) p 9 (Original in Czech)

Book, SNTL, 3rd ed, 320 pp. Price DM 9.--.

Describes the machine tools which are being exported from Czechoslovakia.

[Not in library of Industrial Diamond Information Bureau].

K *Pr.326*

'60 The Tool Engineer Suppliers Directory—Products

Anon. *Tool Engr* 1960 Vol 44 (7) pp 135-216 (June 15)

Products specified by tool and manufacturing engineers are listed alphabetically. Each product heading is followed by a list of companies specializing in manufacture of the product.

D *T.241.514*

'60 The Tool Engineer Suppliers Directory — Manufacturers

Anon. *Tool Engr* 1960 Vol 44 (7) pp 233-296 (June 15)

Manufacturers listed are restricted to companies whose products are specified by tool and manufacturing engineers.

D *.241.514*

Metalworking lubricants

L. C. Hays. *Tool Engr* 1960 Vol 44 (6) pp 207-211 (June)

D *Sk*

Continuous numerical control of machine tools [Pt I]

P. S. T. Buckerfield (Associated Electrical Industries Ltd). *Control* 1960 Vol 3 (24) pp 90-94 (June)

The control system described here has been designed for the continuous numerical control in three dimensions of milling or boring machines for such operations as profiling, contouring or die-sinking. 4 illustr. (To be cont).

D *Cfd Pr.134/Cff Pr.134*

Electronic control and inspection

Ferranti Ltd, Hollinwood, Lancs. *Mech World* 1960 Vol 140 (3493) p 336 (Aug)

Two new and economically priced control systems have been introduced. One is a continuous control system which uses transistors, hydraulic servo-mechanism and a simplified measuring system to ease maintenance and reduce costs by 25% compared with the old system; the other is designed for rapid point-to-point positioning of machine tool and allied equipment in Cartesian or polar co-ordinates.

D *Pr Wpz*

Juggler's stand

Rubert & Co Ltd, Cheadle, Cheshire. *New Scientist* 1960 Vol 8 (192) p 222 (July 21)

A new supporting stand for cylindrical components consists of four steel balls locked together on a flat surface: these highly polished balls are said to minimize the possibility of marking the workpiece even when components are rotated. Although intended principally for supporting cylindrical and spherical components during operations, the 'B' Block can also support flat surfaces when testing flatness, for example. 1 illustr. *D* *Cx Psc Wgf*

PUBLICATIONS RECEIVED

BOOK REVIEWS

A hand full of diamonds

V. G. C. Norwood. T. V. Broadman & Co Ltd, 16 Maddox St, London W 1. 1960, 235 pp, illustr. Price 18s

The author has since 1951 led four expeditions into the remotest areas of Guiana and the borders of Brazil in search of diamonds. With his party, he worked under appalling conditions but improved on the methods of negro prospectors and also deviated from mining procedures to follow the perilous practice of diving for diamonds in rivers where they lay embedded. After considerable difficulties, they succeeded in opening up for production the diamond resources of a pool in the continuation of the Pakariama mountain range. There were grounds for believing that a diamond pipe of great importance existed in the area; the prospectors eventually discovered this matrix of peridotite rock which is the source of diamond supply to the whole Rupununi district.

The book is illustrated with photographs taken by the author. The hardships and fears as well as the beauties of the jungle are described and make interesting reading. *L* *Ebc.12.345.525*

34th Annual Report on the Diamond Industry 1958

G. Switzer. Jewelers' Circular Keystone, Chestnut and 56th Sts, Philadelphia 39, Pa. 1959, 16 pp tables

Tables show sales, import and export figures. Diamond cutting and trade are dealt with under countries. Records activities of De Beers Consolidated Mines Ltd, the Diamond Corporation Ltd, The Diamond Purchasing and Trading Co Ltd, and The Diamond Trading Co Ltd, Industrial Distributors (1946) Ltd and Industrial Distributors (Sales) Limited. Production of the chief diamond mining countries and companies is covered, and GEC's progress in marketing of synthetic diamonds is mentioned. Chief emphasis is placed on gem diamonds. *D* *F.25.52*

Ceramic tools—a revolution in metal cutting. Les outils en céramique—une révolution dans la coupe des métaux

E. Blanpain. Editions Eyrolles, 61 Bd Saint Germain, Paris 5e. 1958, 96 pp, illustr. Price 14s. (In French)

Although fragile, ceramic cutting edges can last up to five times as long as conventional tools, it is claimed. This short book attempts to evaluate the importance of this revolutionary material for the machine tool industry. There is a chapter on the properties of ceramics, rules for honing, and in the penultimate chapter they are compared for economy with carbide tools. *K* *Bf Ceg Pdd.52*

Diffraction gratings as measuring scales

J. Guild. Oxford University Press, London, New York, Toronto. 1960, 211 pp, illustr, indices. Price 35s

It is now widely appreciated that for many purposes diffraction gratings, used as measuring scales by the moiré technique, have some important advantages over micrometer screws and conventional linear scales, while in the industrial field the use of gratings as pulse-generating scales for automatically controlled machine tools is now familiar. In addition, new industrial applications have been found in testing and improving the performance of lead-screws and gear trains of screw cutting lathes, *etc.* Two approaches are developing: the use of the moiré technique to test and record errors with great accuracy and detail and to provide the basis for correction of such errors; and the automatic inhibition of errors during the normal working cycle of the machines by appropriate servo controls operated by the moiré signals. Thus, the accuracy of the work produced is dependent on the accuracy of the grating rulings controlling the lead screws or gear trains, which merely serve to transmit the drive. Such developments open up prospects of almost revolutionary changes in future design of machine tools for precision engineering. This book seeks to provide those concerned with the design of such machines with detailed information on the construction and use of practical moiré fringe equipment. Much detail is devoted to requirements and behaviour of this measuring device, but it is stressed that moiré equipment is not especially difficult to construct or use. Sufficient theoretical explanation is included to make the book self-contained.

D *Tfd Vfd.52*

Dendritic crystallization

D. D. Saratovkin (translated from the Russian by J. E. S. Bradley). Chapman & Hall Ltd, 37 Essex St, London WC 2, Consultants Bureau Inc, NY. 1959, 2nd ed, 126 pp, illustr. Price £2 10s 0d

Fresh material derived from observations under the stereoscopic microscope is added to that included in the 1953 edition. The first section deals briefly with some general concepts on crystallization, distinguishing genetic and structural crystal types, including some aspects of the defect crystal state. Other sections cover D. K. Chernov's observations which form the basic ideas behind much knowledge of dendritic crystallization. Current views on the subject are surveyed and criticized. All types of growth forms of real crystals are reviewed but only dendritic or closely related forms are investigated in detail. The author expresses many original and unpublished ideas and the subject is illustrated with photographs, tables and figures. Literature cited is listed. *D* *Vhfz.52*

The Instrument Manual

United Trade Press Ltd, 9 Gough Sq, Fleet St, London EC 4. 1960, 3rd ed, 742 pp, plus 98 pp appendix, illustr. Price £5 5s 0d

This new and revised edition follows the 1953 edition in general scheme but has alterations to reflect new developments, notably in automation and nucleonics. The section on navigational instruments has been replaced by one on analogue computors. The original optical section has been dispersed : *eg* microscopy is given a separate section. Some section titles have been modified to indicate their contents more accurately. To each section is added a short bibliography referring to standard specificatons, textbooks and technical articles and also a buyers' guide to British firms. The field of hardness testng is dealt with briefly.

D *W.523*

Mounted wheels, safe and efficient operation, maximum operation speeds

Grinding Wheel Institute, 2130 Keith Building, Cleveland 15, Onio. 1956, 32 pp, illustr, tables, revised January 1960

Recommendations for the safe operation of mounted wheels and the maximum operating speeds are followed by illustrations of the different shapes of wheel manufactured and specifications thereof.

A *Pez.254.52/Pez.2595.52*

British Standards Yearbook 1960

British Standards Institution, 2 Park St, London W 1. 1960, 592 pp. Price 15s

Contains information about the Institution and the services it offers. British Standards current at Jan 1, 1960, are listed and described briefly.

D *.255.321.515*

Fine particle measurement

C. Orr, J. M. Dallavalle. The Macmillan Co, New York. 1959, 353 pp, illustr

A detailed discussion of the important techniques used in research laboratories for the measurement of size, surface and pore volume. Both theory and application are covered and a comprehensive description is given of over seventy techniques. The authors' object is to present information that will enable readers to understand basic principles, construction and use of apparatus, methods of data analysis, applications and limitations. Lists of symbols and abbreviations are provided. An appendix gives comparisons of results by various methods, and typical results that may serve to suggest order-of-magnitude values for unmeasured but similar materials. There is an extensive bibliography.

D *Vgf.1456.52*

Safety in the use of abrasive wheels

Ministry of Labour & National Service. H.M. Stationery Office, London SE 1. 1959, New Series No 4, 64 pp, illustr. Price 4s

The purpose of the booklet is to advise on precautions for accident prevention in the use of abrasive wheels, covering wheel breakage, contact with the running wheel and projection of the work. Technical aspects of grinding and operational technique are not discussed.

D *Pe.2595.526*

Non-destructive testing

J. F. Hinsley. Macdonald & Evans Ltd, 8 John St, London WC 1. 1959, 495 pp, illustr, indices. Price 75s

The practice of non-destructive testing of materials and components is progressing so rapidly that it is not possible to write a comprehensive treatise on the subject ; this book is a broad survey of the subject, with references for those who wish to pursue the more advanced topics. The author is a recognized authority in this field, and has dealt at some length with well-established methods, while including such newer techniques as show promise of extended utility. Finding hidden defects by means of radiological examination, ultrasonic testing, magnetic methods and surface flow detection by electrical, electrochemical, chemical and penetrant methods are discussed, as well as various other less widely adopted methods. The physical processes and their adaptation for the purposes of non-destructive testing are described ; emphasis has been placed on the historical development of certain methods. Diffraction is dealt with, and there are chapters on mathematics in relation to non-destructive testing and safety precautions in radiological laboratories.

The language of the subject is explained and many elementary explanations are included. The book is recommended to all concerned with the inspection and testing of manufactured products, particularly to students and inspection engineers. A comprehensive index enables the book to be used for reference.

L *Cy.52*

Mining Year Book 1960

W. E. Skinner. Walter E. Skinner, 20 Copthall Ave, London EC 2 ; Financial Times, Bracken Hse, 10 Cannon St, London EC 4. 74th ed, 820 pp. Price £2

Includes a buyers' guide, world production tables of gold and base metals, and particulars of world mining and metal companies, including the diamond concerns.

D *Cb.31.515/Hd.31.515*

Machinery's Handbook

E. Oberg, F. D. Jones. The Industrial Press, 93 Worth St, New York 13, NY. 1959, 16th ed, 2104 pp, illustr, tables. Price £4 8s 0d

Described as a reference book for the mechanical engineer, draughtsman, toolmaker and machinist, this edition aims to be of increasing practical value and represents the most extensive revision of the handbook for over 25 years. Recent or revised American and British engineering standards are given and a large amount of general information and mechanical data is included. Copious tables are provided and despite the book's size, the layout and indexing simplify location of material. There are sections on diamond wheels and abrasives.

D *Nv.523/Pr.523*

Mellon Institute Research—Annual Report 1959-1960

M. B. Ridgway. Mellon Institute, 4400 Fifth Ave, Pittsburgh 13, Pa. 1960, 33 pp, illustr

Metal physics and glass properties are among the subjects of research.

D *Bf Vwg.52/Bm U.52*

IDR REPRINT SERVICE

The following reprints are available from Industrial Diamond Information Bureau, 2 Charterhouse Street, London EC 1, at a charge of 1s each, post free :

C 98—The resistance of diamond to abrasion, by E. M. Wilks and J. Wilks (*Phil Mag* 1959).

I 252—A new method of determining the average shape of diamond and other particles, by J. F. H. Custers and F. A. Raal ; A counting device for diamonds, by F. A. Raal, (*IDR* 1959).

I 253—Factors affecting the efficiency of resinoid-bonded diamond wheels, by R. G. Weavind (*IDR* 1959).

TRADE LITERATURE

A precision diamond paste X-17 for grinding and polishing

Charles Churchill & Co Ltd, Coventry Rd, South Yardley, Birmingham. 1 p, 8½ × 11 in., illustr

Diamond paste X-17 contains grains which have been accurately sorted for size and shape, so that each one is a working grain. Twelve different grain sizes are available and a special diluent enables the user to keep it at the correct thickness.

A *Ch Kmg.57*

Diamond impregnated metal bonded tools

British American Optical Co, 39 Hatton Gdn, London EC 1. 16 pp, 5½ × 8½ in., illustr

Tools available include various types of cup wheel, dish wheels, hand laps, chipbreaker and peripheral wheels, internal grinders, edging wheels, and drills for glass and hard materials. Special instructions to follow when using metal bonded diamond impregnated tools are given as a preface. *D* *Nq Urc.57*

Modern machine tools

Giddings & Lewis Machine Tool Co, Fond du Lac, Wisc. 32 pp, 8½ × 11 in., illustr

The catalogue is divided into four parts corresponding to the company's divisions. Various types of machine tools, many of them photographed, include milling, drilling, planing and turning tools.

D *Pr.57*

Landis Lund precision grinders and fine borers

Landis Lund Ltd, Cross Hills, Keighley, Yorks. 8 pp, 8½ × 11 in., illustr

Besides describing various machines, the leaflet lists the company's agents in the UK and overseas.

D *Cfdb Pr.57/Chcw Pr.57*

Kentron micro hardness tester

Torsion Balance Company, Clifton, NJ. 4 pp, 8½ × 11 in., illustr

Gives details of Model AK Kentron micro-hardness tester for research work in the metallurgical laboratory. Vertical capacity is 2½ in. and the instrument has both Knoop and diamond pyramid indenters. Model AK8, basically a produtcion control instrument, but having the same accuracy as Model AK, is briefly described. Kentron accessories include the V-Test Cradle to hold rounds from 1/16 in. to 2 in. without mounting, and various clamps and vices. Calibrated reference blocks are available so that instruments may be checked against a standard reference. These blocks can be used with the Kentron or any other type of micro-hardness tester that utilizes optical means for measuring indentations. *D* *Nde Wghd.57*

High precision grinding machines

Fritz Studer Ltd, Glockenthal-Thun, Switzerland. 18 pp, 8½ × 5½ in., illustr. (In English)

Universal and production cylindrical grinding machines, surface grinding machines, parallel face grinding and lapping machines, profile grinding and template milling machines, and taper checking apparatus are demonstrated. A detailed photograph shows the diamond being set for profiling the grinding wheel on the PSM 150 profile grinding machine.

A *Ab Cgf Nj.57/Chcw Pr.57*

Sterling specifications [Collected catalogues]

Sterling Grinding Wheel Co, Tiffin, Ohio.

Specifications are offered as a general guide to wheel selection. Cylindrical, internal, centreless, surface, tool-room and portable grinding are covered, as are cut-off and snagging operations. *D* *Pe.254.57*

Sterling's No 2 chuck and segments

Sterling Grinding Wheel Co, Tiffin, Ohio. 4 pp, 8½ × 11 in., illustr

The No 2 chuck is light and therefore releases extra power for grinding. It is said to be always safe to use, while individual mountings provide a positive segment grip easily regulated by twisting a socket wrench. Adaptable to all surface grinders, the chucks are supplied to take segment rings from 8 to 42 in. diameter. The minute air spaces between each segment are said to mean cooler grinding, wider spread of coolant, and better finish without chatter marks. Suggested segmental specifications and a price-list are given. *D* *Chc Pr Psh.57*

Sterling cylindrical grinding wheels

Sterling Grinding Wheel Co, Tiffin, Ohio. 4 pp, 8½ × 11 in., illustr

The new V2 vitrified bond is said to ensure uniformity in cylindrical grinding wheels. The bond holds the abrasive until all sharpness has been utilized. Less dressing is needed and it can be done by unskilled operators. An important feature is the ability of these wheels to perform many jobs although designed to meet specific requirements. Other advantages claimed are faster generation and less wheel wear than is usual. Specifications are given. *D* *Pez.57*

Jones-Shipman 540 hydraulic surface grinder

A. A. Jones & Shipman Ltd, Narborough Rd South, Leicester. 12 pp, 8½ × 11 in., illustr

Capacity is 6 in. × 18 in. and the main characteristic of the machine is simple design combined with accuracy. Predominant features listed include patented low pressure, long life Hydraulic System, table traverse rates varying from 5 to 40 ft/min, completely centralized controls, and cross feed automatically variable from 0.01 to 0.07 in./stroke. Standard equipment includes wheel truing attachment, without diamond, but the Diaform wheel forming attachment is available as an extra. Each feature is explained and illustrated and particulars are given of dimensions.

See also *Industr Diam Abstr* 1960 Vol 17 p A96 (Apr).

D *Chcm Pr.57*

Jones-Shipman precision machine tools, issue No 19

A. A. Jones & Shipman Ltd, Narborough Rd South, Leicester. 8 pp, 6½ × 9 in., illustr

The application of certain machines, *eg* Model 1212 High Precision Grinding Machine, is illustrated by describing their use by various companies.

D *Chcw Pr.57*

Newall machine tools

Newall Group Sales Ltd, Peterborough. 24 pp, 8 × 11 in., illustr. (In English, French and German)

Machines described and photographed include cylindrical, angle head, multi-wheel, internal and thread grinders, as well as lapping machines, jig and fine boring machines. Automatic units for large scale component production are also produced and examples are photographed.

D *Cfd Pr.57/Chc Pr.57/Chd Pr.57*

PATENT LISTS

BRITISH

The Official Journal (Patents) 1960 (3724) (June 29)

845,572 AUTOFLOW ENGINEERING LTD. Grinding machines, particularly for edge-grinding ophthalmic lenses.

845,969 SWIATKIEWICZ, K. Glass cutters.

845,795 ABBOTT, M. E. Apparatus for investigating surface profiles.

846,187 UNIMATIC MANUFACTURING INC. Abrasive tools and methods of making and using same.

The Official Journal (Patents) 1960 (3725) (July 6)

846,275 INOUE, J. Manufacture of curved tooth involute gears.

846,388 KENDALL, G. H., HOST, J. A., and KENDALL, G. H., jun. Machine tools.

846,896 NATIONAL BROACH AND MACHINE CO. Gear finishing.

846,568 MINNESOTA MINING AND MANUFACTURING CO. Abrasive wheels and a method of using them.

846,276 INOUE, J. Gear grinding machines.

The Official Journal (Patents) 1960 (3726) (July 13)

847,411 FOUQUET, E. Process for machining metal parts.

847,412 SCHUMAG SCHUMACHER METALLWERKE GmbH. Centreless grinding machine for cylindrical work pieces.

846,971 AGIE AKTIENGESELLSCHAFT FUER INDUSTRIELLE ELEKTRONIK LOCARNO. Electro-erosion machines.

847,344 CINCINNATI MILLING MACHINE CO. Gauging device for grinding machines.

The Official Journal (Patents) 1960 (3727) (July 20)

847,855 FOUQUET, E. Machine for the application of a milling method.

847,719 DEWRANCE & CO LTD. Lapping machines.

The Official Journal (Patents) 1960 (3728) (July 27)

849,205 SOC D'APPLICATIONS ET DE CONSTRUCTIONS POUR MATERIAL AUTOMOBILE SACMA. Methods and apparatus for machining a workpiece by means of an erosive fluid.

848,530 BISTERFELD, E. (trading as BISTERFELD & STOLTING). Grinding wheels.

UNITED STATES

Official Journal 1960 Vol 755 (1-4) (June)

2,939,250 J. E. KLINE, MICROMATIC HONE CORP. Resonant honing.

2,939,251 J. H. GREENING, MICROMATIC HONE CORP. High frequency honing.

2,939,252 F. COOKE, AMERICAN OPTICAL CO. Ultrasonic lens generators.

2,939,684 L. L. PAYNE, HUGHES TOOL CO. Cutter for well drills.

2,939,691 W. H. LEWIS. Pavement cutting apparatus having spaced cutter disks.

2,939,777 J. R. GREGOR, H. E. VAN ORDEN, ABRASION & METAL PRODUCTS CO. Abrasives.

2,939,941 M. HARSCHAP, C. M. LEVITH, CROWN MINES. Eroding of hard crystalline carbon.

2,940,226 W. OSENBERG, BISTERFELD & STOLTING. Fusion abrading process for surface-working flat and curved surfaces of metal bodies and apparatus for carrying out said process.

2,940,841 J. R. GREGOR, H. E. VAN ORDEN, ABRASIVE & METAL PRODUCTS CO. Abrasives.

2,940,842 D. G. PHILLIPS, PRECISION GRINDING WHEEL CO. INC. Abrasive articles.

2,941,338 J. V. SANTSCHI, PITTSBURGH PLATE GLASS CO. Apparatus for glass drilling.

2,941,861 R. H. WENDORF jun, GENERAL ELECTRIC CO. Method of making garnet.

2,942,383 G. C. BROWN, R. N. RONEY, SHEFFIELD CORP. Machine device.

2,942,387 F. W. LINDBLAD. Cup-shaped diamond grinding wheel.

2,942,389 W. S. PRAEG, W. S. SIGMAN jun, NATIONAL BROACH & MACHINE CO. Gear finishing.

2,942,458 G. A. KERR. Hardness tester.

2,942,849 A. G. BODINE. Method for sonic earth boring by use of resonant wave pattern transmitted from ground surface.

AUSTRALIAN

Official Journal 1960 Vol 30 (14-19) (Apr-June)

227,743 PETER SPENCE & SONS LTD, DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORM ROESSLER. Production of corundum.

228,023 WICKMAN LTD. Spark machining.

228,044 COMMONWEALTH SCIENTIFIC & INDUSTRIAL RESEARCH ORGANIZATION. Machining metals.

SWISS

Patentliste 1960 (10-11) (May-June)

346,666 A. ROSS, A. VOGT. Artificial gem stone.

346,784 O. AUGUSTIN, SWISSTOOL AG. Method and device for grinding or lapping the centre-holes in workpieces with pre-drilled holes.

346,953 J. PFAU, ATELIERS DES CHARMILLES SA. Method of electrical machining.

347,129 M. HEERSCHAP, C. M. LEVITT, INDUSTRIAL DISTRIBUTORS (1946) LTD. Method for eroding a diamond and device for carrying out this method.

FRENCH

Bulletin Officiel 1960 Vol 1 (23-26) (June-July)

1,233,689 J. GASTAUD. Machine for the spark machining of disks for the manufacture of glass fibres.

1,233,568 SOC INDUSTRIELLE ET COMMERCIALE DES OUVRIERS LUNETIERS (COTTET, POICHET, TAGNON & CIE). Polishing machine.

1,233,626 ETS J. K. SMIT & FILS. Drilling tool.

1,233,721 BOLIDENS GRUV AKTIEBOLAG. Diamond drilling machine.

1,235,110 R. G. ELLIS, MICROMATIC HONE CORP. Grinding elements.

1,235,832 W. HENNINGS, E. ZIMMERMANN. Method and device for cutting glass tubes.

1,235,514 J. GASTAUD. Machine for sharpening and cutting by electro-erosion.

GERMAN

Patentblatt 1960 Vol 80 (25-29) (June-July)

Applications Open to Public Inspection

1,083,953 FIRTH STERLING INC. Method and device for machining by spark erosion.

1,084,164 P. ANGENIEUX. Device for polishing spherical surfaces.

1,084,165 WERNICKE & CO KG. Truing device for grinding wheels, in particular for bevel grinding machines for spectacle lenses.

1,084,190 W. FUCHS, K. WOLF, K. FROEHLICH, WALLRAM HARTMETALL GmbH. Tool for stone working.

1,084,705 J. CSORDAS, B. LANYI, Z. VERES, L. VISY, KÁBEL-ES MUANJAGGYAR. Producing finely granular corundum, especially adapted for metal-ceramic purposes.

1,085,013 O. BAUKNECHT, ZAHNRADFABRIK FRIEDRICHSCHAFEN AG. Device for profile grinding machines for surfacing tooth flanks, in particular of gear wheels with helical teeth.

1,085,063 TELEFUNKEN GmbH. Device for producing convex surfaces on workpieces made from piezo-electric material.

1,085,789 W. G. KLINGELNBERG SOEHNE. Worm and thread grinding machine.

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Patent Granted

973,902 E. M. TRENT, HARD METAL TOOLS LTD. Hard metal.

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***THE DIAMOND RESEARCH LABORATORY:** 16 pp, illustr, 11 x 9 in. Rev ed, 1956.

SELECTED BIBLIOGRAPHIES:

* **Truing of grinding wheels** (from 1910 to 1951). 39 pp, 7⅞ x 9¾ in. 3rd rev ed, Feb 1952.

* **Diamond as cutting tool for metals and non-metallic materials.** 24 pp, 7⅞ x 9¾ in. 2nd rev ed, Nov 1950. Name index, 1951.

Hardness and hardness testing (from 1937 to 1955). 118 pp, name index, subject index, 7⅞ x 9¾ in. 1955-56. Price 5s 6d.

DIAMOND TOOL PATENTS (Patent Monographs)

IA: Machining metals and non-metallic substances, by P. Grodzinski, W. Jacobsohn. 2nd rev ed, 55 pp, 7⅞ x 9¾ in. Apr 1949. Price 10s.

II, IIs: Diamond abrasive wheels, by P. Grodzinski. 74 pp, 4 tables, name index, 7⅞ x 9¾ in. Aug 1948/49. Price 13s 6d.

III, IIIs: Truing of grinding wheels, by W. Jacobsohn. 133 pp, 82 illustr, name index, 7⅞ x 9¾ in. Dec 1948/49. Price £1.

IV: Polishing of gem diamonds, by W. Jacobsohn. 40 pp, 83 illustr, 1 table, name index, 7⅞ x 9¾ in. December, 1950. Price 12s 6d.

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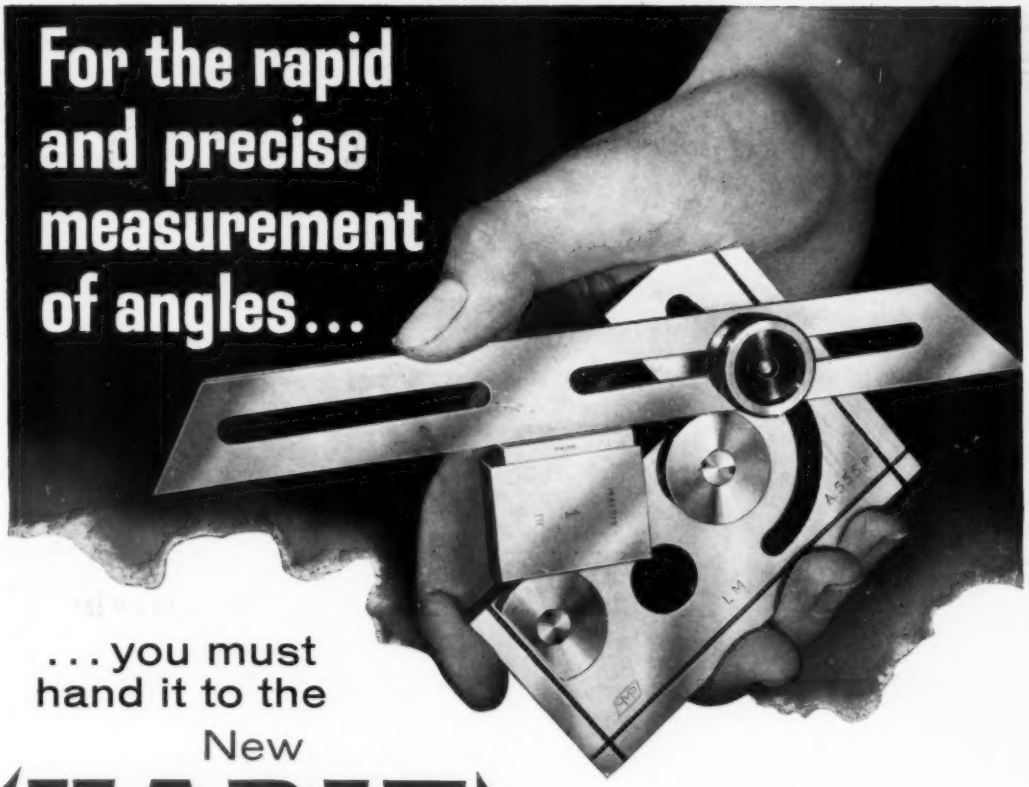

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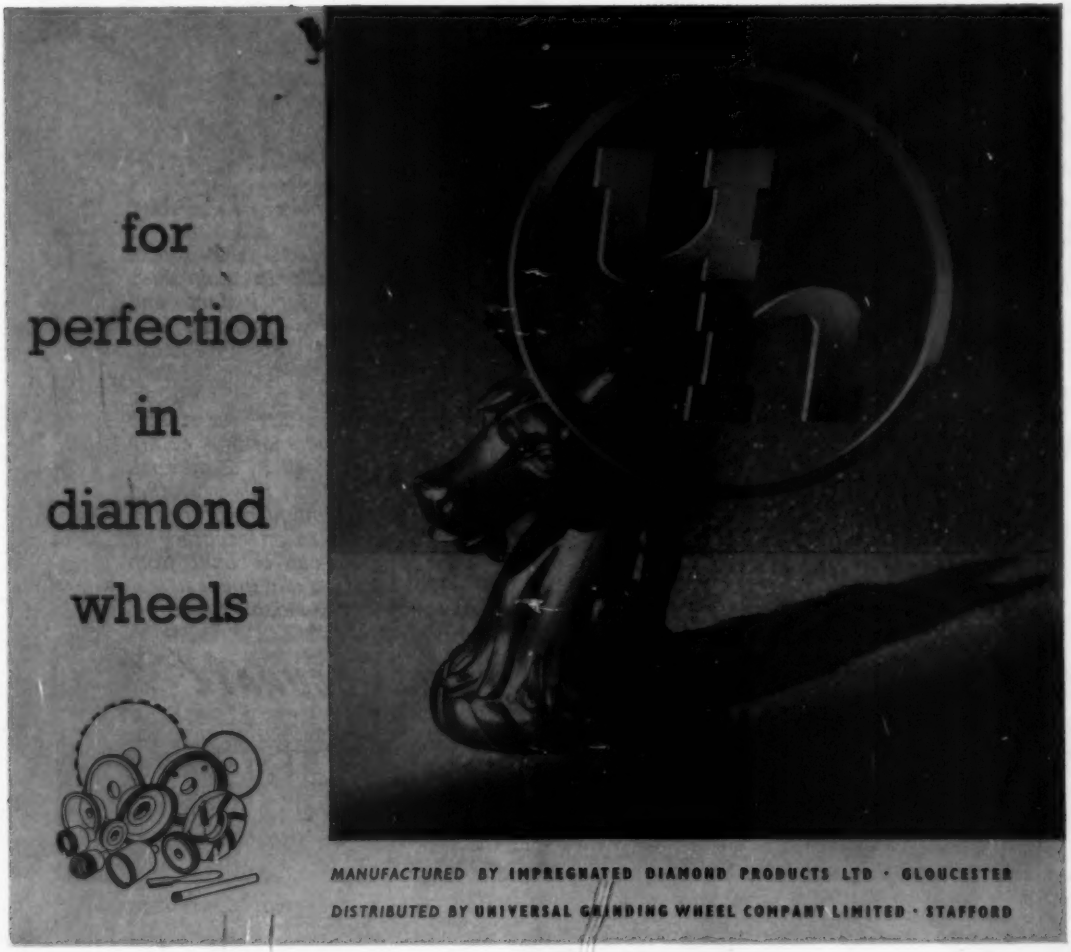
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